

**NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION**

**MATERIALS AND RESEARCH
DIVISION**

Experimental Study ND 92-05

**Evaluation of a Permeable Asphalt
Stabilized Base Beneath
an Asphalt Pavement**

Fourth Annual Report

Project CM-6-002(039)318

January 1997

Prepared by

**NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
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Marshall W. Moore**

**MATERIALS AND RESEARCH DIVISION
Ron Horner**

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION									
EXPERIMENTAL PROJECT REPORT									
EXPERIMENTAL PROJECT	EXPERIMENTAL PROJECT NO.						CONSTRUCTION PROJ NO CM-6-022(039)318		LOCATION Grand Forks County
	1	STATE ND	Y EAR 92	-	NUMBER 05	SURF	8		
	EVALUATION FUNDING						NEEP NO. <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div>	PROPRIETARY FEATURE?	
	48	1 X	HP&R	3	DEMONSTRATION			51	X No
		2	CONSTRUCTION	4	IMPLEMENTATION		49		
SHORT TITLE	TITLE 52 Permeable Asphalt Stabilized Base Beneath an Asphalt								
THIS FORM	DATE 140	MO. 02	--	YR. 97	REPORTING 1 INITIAL 2 X ANNUAL 3 FINAL				
KEY WORDS	KEY WORD 1 BASESUBBASES 145				KEY WORD 2 TREATED 167				
	KEY WORD 3 Asphalt 189				KEY WORD 4 211				
	UNIQUE WORD Permeable Base 233				PROPRIETARY FEATURE NAME 255				
CHRONOLOGY	Date Work Plan Approved 10-92 277		Date Feature Constructed: 06-92 281		Evaluation Scheduled Until: 05-97 285		Evaluation Extended Until: 289		Date Evaluation Terminated: 293
QUANTITY AND COST	QUANTITY OF UNITS (ROUNDED TO WHOLE NUMBERS)			UNITS			UNIT COST (<i>Dollars, Cents</i>)		
	<div style="border: 1px solid black; width: 150px; height: 30px; margin: 0 auto; text-align: center;">2023</div>			1 LIN. FT 2 SY 3 SY-IN 4 CY 305			5 X TON 6 LBS 7 EACH 8 LUMP SUM 306		
AVAILABLE EVALUATION REPORTS	X CONSTRUCTION 315			PERFORMANCE			FINAL		
EVALUATION	CONSTRUCTION PROBLEMS				PERFORMANCE				
	1	NONE			1	EXCELLENT			
	2	SLIGHT			2	GOOD			
	3 X	MODERATE			3	SATISFACTORY			
	4	SIGNIFICANT			4	MARGINAL			
	5	SEVERE			5	UNSATISFACTORY			
APPLICATION	1	ADOPTED AS PRIMARY STD.			4	PENDING			
	2	PERMITTED ALTERNATIVE			5	REJECTED			
	3	ADOPTED CONDITIONALLY			6	NOT CONSTRUCTED			
REMARKS	321 The rate of transverse crack formation over the permeable asphalt base has leveled off while the rate of increase has accelerated over the other section.								

Experimental Study ND 92-05

**Evaluation of a Permeable Asphalt Stabilized
Base Beneath an Asphalt Pavement**

FOURTH ANNUAL REPORT

Project CM-6-002(039)318

JANUARY 1997

Written by
Bill Kuhlmann

Disclaimer

The contents of this report reflect the views of the author or authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not reflect the official views of the North Dakota Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

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EVALUATION OF A PERMEABLE ASPHALT STABILIZED BASE BENEATH AN ASPHALT PAVEMENT

PROJECT CM-6-002(039)318

Objective

The objective of this study is to determine if a permeable asphalt stabilized base can be as effective as other established methods in preventing alligator and transverse cracking, rutting, and patching.

Scope

The normal practice to correct cracking, rutting, and patching is to mill and overlay or to reconstruct the section. The scope of this study is to compare the performance of an asphalt roadway constructed with a permeable asphalt stabilized base (PASB) with edge drains to the three sections listed below:

- 1) Dense Graded Base (DGB) with Edgedrains
- 2) Dense Graded Base (DGB) without Edgedrains
- 3) Mill and Overlay

Location

This test section is located in Grand Forks County, North Dakota, in the westbound lanes of Highway 2 in reference miles 320 and 321. Two eastbound sections were selected in reference miles 319 and 325.

The entire project comprised 23.395 miles, 9.880 miles in the eastbound lanes, 15.595 miles in the westbound lanes, and 2.08 miles for exceptions. Of the 23.395 miles, 1.50 miles were selected to test the effectiveness of a permeable asphalt stabilized base to delay the development of cracks and rutting. Photo 1 is a view of the roadway in the area of the test section.

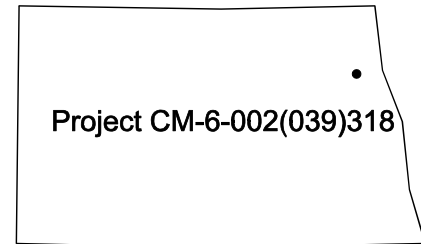


Photo 1: View of roadway at test sections looking west

Project History

Construction

Table 1 shows the history of the pavement sections from mile 318.984 to 329.073:

Year Constructed	Type of Construction	Depth (in.)	
1962	Grade		48
1963	Aggregate Base	8.0	32
1982	Hot Bit Pavement	2.0	30
1982	Hot Bit Pavement Level Course	1.5	27
1962	Grade		48
1963	Aggregate Base	5.0	44
1963	Hot Bit Pavement	4.0	42
1963	Hot Bit Pavement Wrng Course	2.0	24
1969	Hot Bit Pavement Level Course	2.0	42
1969	Hot Bit Pavement Wrng Course	1.5	24
1971	Plant Mix Seal	0.5	24
1962	Grade		48
1963	Aggregate Base	5.0	44
1963	Hot Bit Pavement	4.0	42
1963	Hot Bit Pavement Wrng Course	2.0	24
1969	Hot Bit Pavement Level Course	2.0	42
1969	Hot Bit Pavement Wrng Course	1.5	24
1972	Plant Mix Seal	0.5	24

Table 1

Traffic

Table 2 is traffic data in reference to 1.5 miles east of east junction ND 32 to 1.4 miles west of junction ND 18. This data is the same for both the eastbound and westbound roadways for the year of construction (1992) and for the current year (1996).

YEAR	PASSENGER	TRUCKS	TOTAL	30 TH MAX HR	FLEXIBLE ESALS
1992	1050	250	1300	130	175
1996	1500	330	1830	180	260

Table 2

Design

Materials and Research Division did extensive testing to determine the best method of rehabilitation. The 1990 distress score was 79. The primary distresses were alligator and transverse cracking, rutting, and patching. The average rut was 0.42 inches.

Core data for the westbound lanes measured an average of 3.56 inches of HBP with an average of 0.94 inches of patch and seal material for a total thickness of 4.5 inches. Aggregate base thicknesses were measured during drilling operations to obtain California Bearing Ratio (CBR) samples. The average base thickness measured was approximately 7.0 inches.

FWD testing detected a weak subgrade predominately under the westbound roadway in the western portion of the project. Subgrade modulus of elasticity values were consistently at or below 4,000 psi from milepoint 319.000 to milepoint 322.436. The CBR samples through this area also had very low values with high liquid limits. CBR values of one with liquid limits in the 60 to 90 range indicate very unstable material.

The core data for the segment of the eastbound roadway from milepoint 318.984 to milepoint 324.354 (table 1) indicated an average thickness of 9.38 inches HBP and 1.33 inches patch and seal for a total thickness of 10.71 inches.

The core data for the segment from milepoint 324.354 to milepoint 329.073 (table 1) indicated an average thickness of 8.90 inches HBP and 1.25 inches patch and seal for a total

thickness of 10.15 inches. The average base thickness for both segments measured 5.25 inches.

The plans called for installation of the permeable asphalt stabilize base (PASB) section in the westbound subgrade repair area from station 239+44.8 to station 265+44.8 for a total length of 2600 feet. A one-mile section of edge drains would be placed to include the PASB section plus 2600 feet adjacent to the PASB section. The third section would be the control section which would be an adjacent subgrade repair of similar length. The three sections would also be evaluated with sections of the eastbound roadway with a typical mill and overlay section. The typical sections are shown in appendix A.

The drainable base gradation consisted of the following:

<u>Sieve Size</u>	<u>Allowable % Passing</u>
1"	100
3/4"	95 - 100
1/2"	85 - 100
3/8"	60 - 90
#4	15 - 25
#8	2 - 10
#16	2 - 5
#200	0 - 3

Special Provision 208 (Appendix B) required eighty-five percent of the material retained on the #8 sieve have at least two fractured faces produced by a crushing process. The LA Abrasion loss had to be fifty percent or less and the shale content be a maximum of eight percent.

Construction

The project consisted of three major work elements which were:

- 1) Subgrade repair in selected areas
- 2) Milling existing bituminous pavement at select areas
- 3) Placement of HBP on:

- a) Permeable asphalt stabilized base
- b) Dense graded base
- c) Milled pavement

Construction began on June 8, 1992. The prime contractor was Mayo Construction Company, Incorporated. They were responsible for the milling, hot bituminous paving, installing geotextile separation fabric, removing and salvaging bituminous surfacing, and priming aggregate base courses.

Five locations were designated for subgrade repair. The repair consisted of removing and salvaging the bituminous material, removing and salvaging the base course, removing the subcut material and placing the material on the inslopes. The subcut areas as shown in appendix A were scarified, shaped, refilled, and compacted with Class 3 aggregate for the subbase and Class 5 aggregate for the base course. The two sections of subgrade repair in the eastbound roadway had eight inches of Class 3 aggregate, five inches of salvaged aggregate base course, and six and one-half inches of Class 5 aggregate. The longest area of subgrade repair was 18,220 linear feet in the westbound roadway and includes the permeable asphalt stabilized base (PASB) test section. This section called for the placement of eight inches of Class 3 aggregate, four inches of salvaged aggregate base, and six inches of Class 5 aggregate. The test section called for geotextile separation fabric on the subgrade, six inches of Class 3 aggregate, four inches of salvaged aggregate base, four inches of Class 5 aggregate, and four inches of permeable asphalt base material. An edge drain system was installed along the edge of the westbound driving and passing lanes from station 212+64.8 to station 265+44.8 (5280 feet) which includes the test section. The edge drain system required installation prior to the placement of the PASB.

The contractor trenched both sides of the roadway after the subgrade elevation was obtained. Once the trenching was completed, a geotextile separation fabric was placed in the trench followed by the polyvinyl chloride sewer pipe. Granular material that met SP 208 was used to fill the trench from station 239+04.8 to station 265+44.8. Class 5 aggregate was used to fill the remaining trenches.

The limits of the test section, as indicated on the typical sections, were between station 239+04.8 and station 265+44.8. A plan quantity of 2,023 tons of PASB was based on an end

section of 12.17 square feet, a length of 2,640 feet, and a weight per cubic yard of 1.7 ton. Inadvertently, less asphalt was ordered than was needed to complete the entire length of the test section. The reduced tonnage limited the test section from station 244+06 to station 265+44.8 (2138.8 ft).

The PASB was put down in September of 1992 with the temperature of the material greater than 200°F. During the rolling process the material spread or pushed out with each pass of the roller. To correct this action the roller was required to wait until the temperature of the material had fallen to 180°F or less.

Evaluation

Materials and Research visited the test site on December 10, 1996. The eastbound and westbound roadways from milepoint 319 to milepoint 327 were evaluated for various distresses. The stationing for the sections evaluated in this study are listed in table 3:

SECTION	STATIONING	LENGTH (ft.)
Dense Graded Base without Edgedrains	186+24.8 - 212+64.8 Left	2640.00
Dense Graded Base with Edgedrains	212+64.8 - 244+06 Left	3141.20
Permeable Asphalt Stabilized Base	244+06 - 265+44.8 Left	2138.80
Mill and Overlay	103+15.3 - 129+55.3 Right	2640.00
	419+95.3 - 446+35.3 Right	2640.00

Table 3

Transverse cracks were counted in portions of the westbound sections and in two sections in the eastbound roadway for comparison. The two eastbound sections are in mile 319 and in mile 325. All of the sections where the transverse cracks were counted were of a comparable length of approximately 1/2 mile as shown in Table 3.

The evaluation began on the westbound roadway starting near milepoint 329 and continuing through the test sections containing the permeable asphalt stabilized base (PASB) with edgedrains, the dense graded base with edgedrains, and the dense graded base without edgedrains. Upon driving over these sections, the same washboard effect was noticed as was reported in the previous evaluation. It does not appear to have increased in severity.

The cracks in all of the sections except the dense graded base section containing edge-drains were completely across the roadway and extending into the shoulders. All of the cracks were slightly depressed. One-half of the cracks in the dense graded base with edgedrains were completely across the roadway while the other half of the cracks were across the driving lane only.

The PASB section had 49 transverse cracks for an average of 22.9 cracks per 1000 feet. This was an increase of 5% over the 18.2 cracks per 1000 feet average for 1995. Photo 2 illustrates a typical crack in the PASB section. Photo 3 is a close-up view of this crack.

The section containing the dense graded base with edgedrains had 52 transverse cracks for an average of 16.6 cracks per 1000 feet. This was an increase of 1409% over the 1.1 cracks per 1000 feet for 1995. There were several small cracks observed at the west end of the



Photo 2: Typical crack in the PASB section



Photo 3: Close-up view of Photo 2



Photo 4: Typical crack in the dense graded base with edgedrain section

section which were not included in the crack count. The cracks were very tight with very little spalling. Photo 4 is a view of a typical crack observed in this section. The section containing the dense graded base without edgedrains had 39 transverse cracks for an average of 14.8 cracks per 1000 feet. This was an increase of 106% over the 7.2 cracks per 1000 feet for 1995. The cracks that were in one lane only (19 of the 39 cracks) were tight with no spalling. The



Photo 5: Typical crack in the dense graded base without edgedrains



Photo 6: View of a typical depressed crack

cracks that were across the entire roadway were not tight (approximately 1/4 inch wide). Although these cracks were wider, they were not depressed. Photo 5 is a view of a typical crack observed in this section.

The evaluation continued with

the eastbound roadway. There were depressed cracks that were felt as the section was observed. These depressed cracks were mainly in the driving lane for the entire length of the section. Photo 6 shows a depressed crack between

milepoint 322 and milepoint 323. There were also longitudinal cracks on this roadway. They were located approximately 1.5 feet from the centerline in the driving lane. Photo 7 is a view of the longitudinal cracking. From

milepoint 319 to milepoint 319.5 there were 67 transverse and diagonal cracks for an average of 25.4 cracks per 1000 feet. This reflects no change from the number of cracks observed in 1995. From milepoint 325 to milepoint 325.5 there were 100 transverse cracks for an average of 37.9 cracks



Photo 7: View of a typical longitudinal crack in eastbound lanes



Photo 8: Typical crack in eastbound roadway

per 1000 feet. This was an increase of 79% over the 21.2 cracks per 1000 feet observed in 1995. Photo 8 shows a typical crack in the eastbound roadway. Photo 9 is a close-up of photo 8 showing the depression of



Photo 9: Close-up view of Photo 8

the cracks. This condition is typical for all of the transverse cracks other than the cracks in the dense graded base section without edge drains. The cracks in the driving lane had a greater severity than the cracks in the passing lanes.

The cracks per 1000 feet are summarized in the following table:

SECTION		CRACKS PER 1000 FEET		
		1994	1995	1996
Eastbound Roadway	MP 319	--	25.4	25.4
	MP 325	--	21.2	37.9
PASB		15.9	18.2	19.2
Dense Graded with Edgedrains		--	1.1	16.6
Dense Graded without Edgedrains		--	7.2	14.8

Table 4

Ten sections of the edgedrain system were observed with a Pearpoint video system and all ten showed good evidence of drainage as shown by the water lines in photo 10. Photo 11 is a view of a typical outlet for the edgedrains.



Photo 10: View of inside of a typical edgedrain showing flowlines

The Pave Tech distress report in Appendix C shows these sections had a general ride rating range of 3.6 to 4.7 and an average rut of less than 0.19 inches. This puts them in the good to excellent range as



Photo 10: View of inside of a typical edgedrain showing flowlines

shown in the rating scale in Table 5. In the PASB section, the report shows an area approximately 800 feet long with ride scores in the range of 2.8 to 3.4. These are in the poor to fair categories. There were three 100 foot sections in the other two westbound sections that had an average ride score between 2.3 and 2.8 (poor category).

CATEGORY	RUT DEPTH	RIDE RATING
Excellent	0.004 - 0.10	> 4.00
Good	0.10 - 0.25	3.50 - 4.00
Fair	0.25 - 0.50	3.00 - 3.49
Poor	0.50 >	< 3.00

Table 5

SUMMARY:

The drainage system in the dense grade base and PASB sections is working. This is evidenced by water lines as seen from the video inspection of the edge drains. The Pavetech distress report indicates that the overall ride rating is in the good to excellent category for both directions of US Highway 2 from milepoint 319 to milepoint 327. However, there are four 100 foot sections in the westbound lanes where distress scores fall into the poor category. These scores may account for "roughness" felt when the project was evaluated. There were also seven 100 foot sections over the entire project where the scores were in the fair category. These may also explain the "roughness" in the roadway.

Another factor which may influence the observed ride would be the amount of cracking in the sections. At this time the milled and overlaid eastbound roadway has 25.4 and 37.9 cracks per 1000 feet at MP 319 and MP 325 respectively, the PASB test section has 22.9 cracks per 1000 feet, the dense graded base with edgedrains section has 19.7 cracks per 1000 feet, and the dense graded base without edgedrains has 14.8 cracks per 1000 feet.

The average rut from the Pavetech distress report was less than 0.19 inches which is in the good to excellent category.

Appendix A

JOB# 7

FHWA REGION	STATE	PROJECT	SHEET NO.
8	N.D.	CM-6-002(039)318	1

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

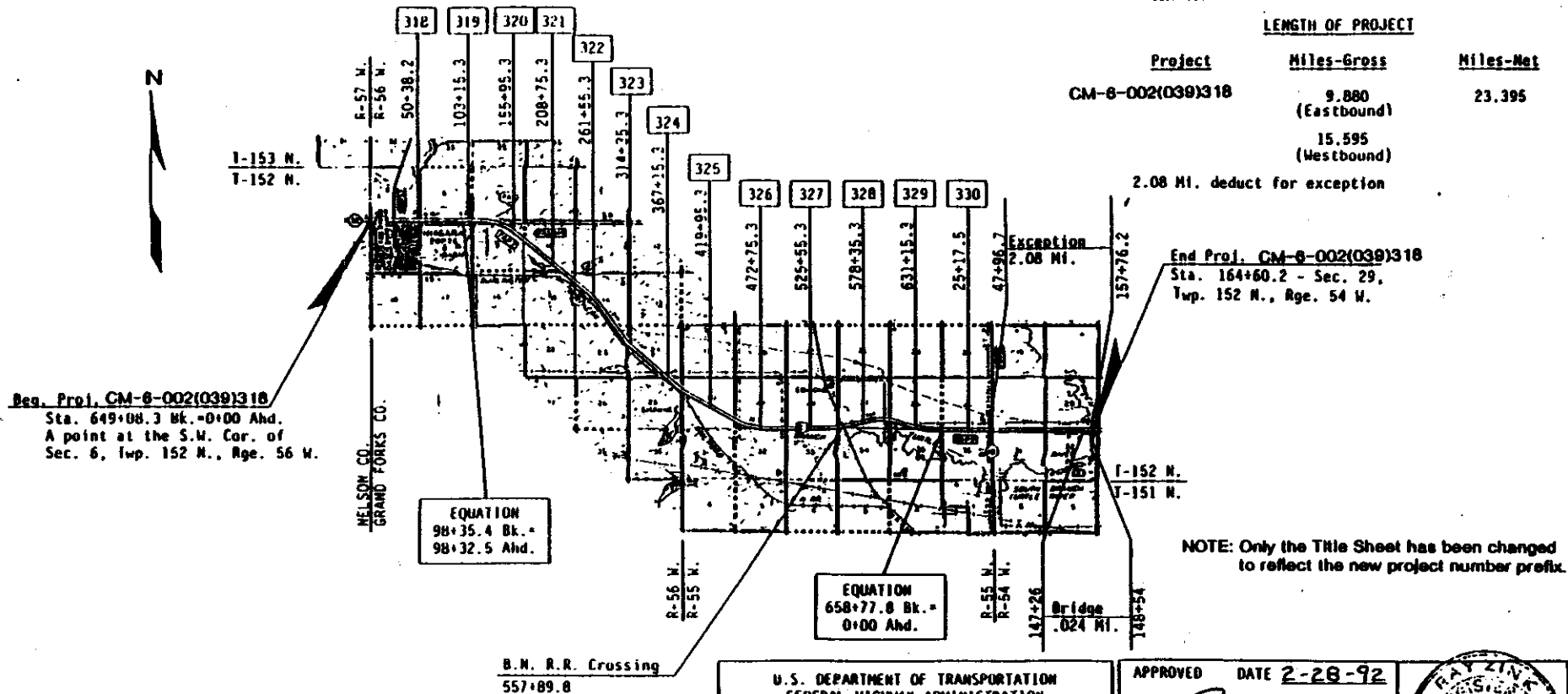
FEDERAL AID PROJECT NO. CM-6-002(039)318
IN GRAND FORKS COUNTY
MILLING, HOT BITUMINOUS PAVEMENT
& INCIDENTALS

COVERING SPECIFICATIONS:

Standard Specifications for Road and Bridge Construction, adopted by the North Dakota State Highway Department, November 1986, shall apply to all North Dakota Department of Transportation contracts, standard drawings currently in effect, and other contract provisions submitted herein.

LENGTH OF PROJECT

Project	Miles-Gross	Miles-Net
CM-6-002(039)318	9.880 (Eastbound)	23.395
	15.595 (Westbound)	
	2.08 Mi. deduct for exception	



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED

DIVISION ADMINISTRATOR

DATE

APPROVED DATE 2-28-92

Ray Zink
DIRECTOR OF HIGHWAYS
AND ENGINEERING

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION



TABLE OF CONTENTS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	NH-6-002(039)318	2

LIST OF STANDARD DRAWINGS

SHEET NO.

DESCRIPTION

1	Title Sheet
2	Table of Contents
3-5	Scope of Work
6-9	Notes
10-13	Estimated Quantities
14-15	Basis of Estimate
16	Design Data, Pavement Marking, Curve Data
17	Mailbox Supports, Special Provisions, Material Size
18-20	Existing Sections
21-23	Milling Sections
24-30	Surfacing Sections
31-33	Subgrade Repair Area
34	Quantities for Subgrade Repair Areas
35	Outlet Pipe Detail
36	Perforated PVC Pipe Detail
37	Concrete Splash Block for Pipe Outlet
38-41	Slope Flattening and Pipe Extensions
42-43	Left Turn Lane at Larimore Dam
44	Borrow Area
45	Approach Details
46	Median X-Overs
47-49	Turn Lanes and Median X-Overs
50-51	Temporary Median X-Overs
52-54	Pavement Marking for Turn Lanes at Median X-Overs
55-58	Guardrail Details
59-65	Box Culvert Extension Details
66-67	Sign Summary Sheet
68	Basis of Estimate - Sign Support Lengths
69-98	Signing Layout
99	Sign Detail Sheet
100-101	Traffic Control for Median Crossover
102	Construction Sign Layout
103	Traffic Control Devices List
104-106	Haul Road Restrictions
107-110	Pit Plats

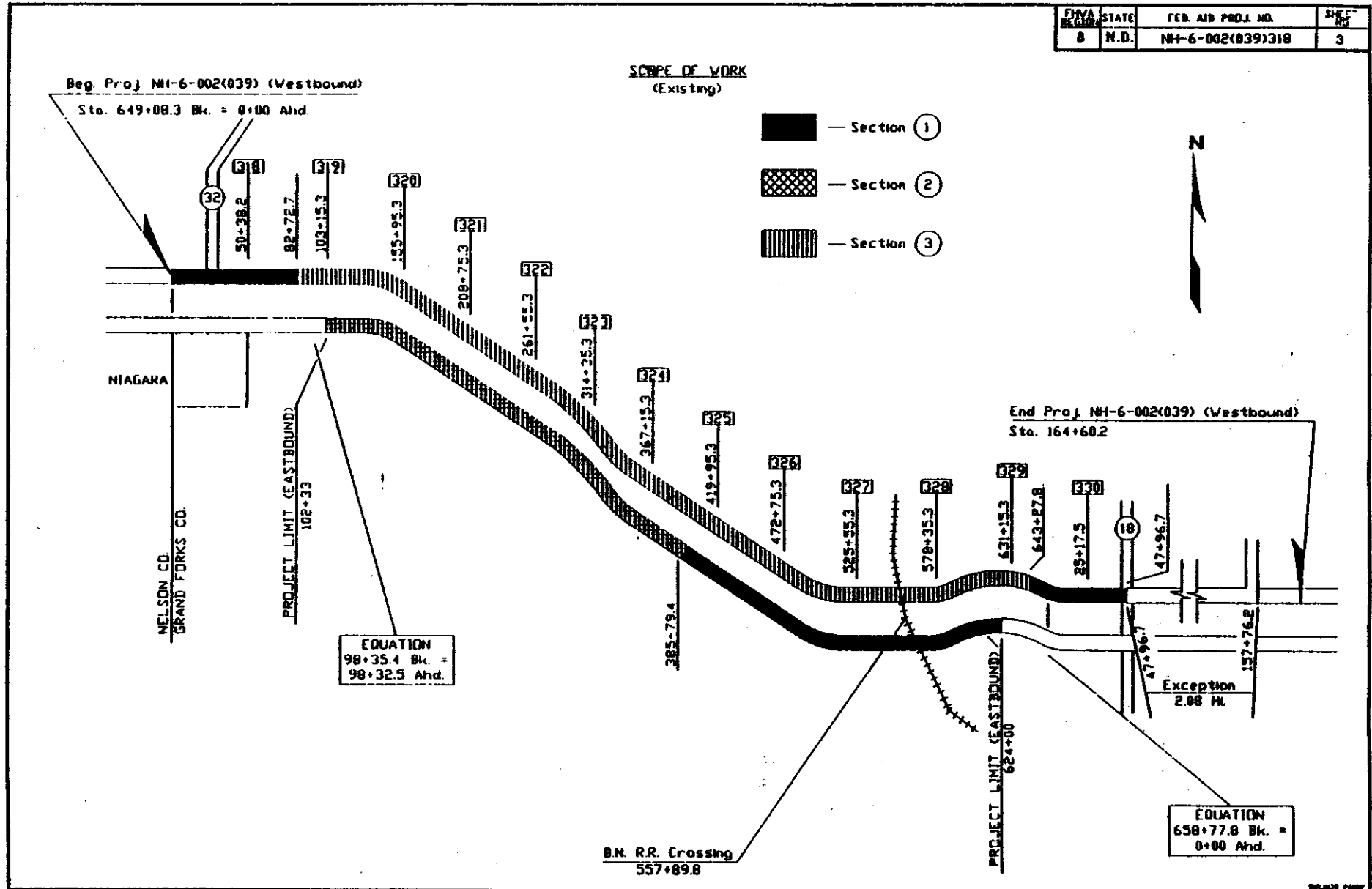
STANDARD NO.

D-706-1	Type C Field Laboratory
D-754-1, 2, 3, 4, 5, 5A, 6, 7, 8, 10, 11, 12, 13A	Construction Sign and Barricade Location Details
D-754-19	Mail Posts
D-754-21A	Reflectorized Delineators
D-754-23	Assembly Details
D-754-24	Mounting Details Perforated Tube
D-754-28, 31, 32, 40, 47, 48, 49, 50, 51, 57, 60, 75, 77, 78	Sign Punching, Stringer and Support Location Details
D-762-1	Pavement Marking Message Details
D-762-3	Striping for Flared Intersections
D-762-4	Pavement Marking
D-762-6	Temporary Striping
D-764-32	Three-Cable Guardrail
D-900-7	Mailbox Location Details

Sheets Revised 6-5-92:

100 and 101

FED. AID PROJ. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	NH-6-002(039)318	3



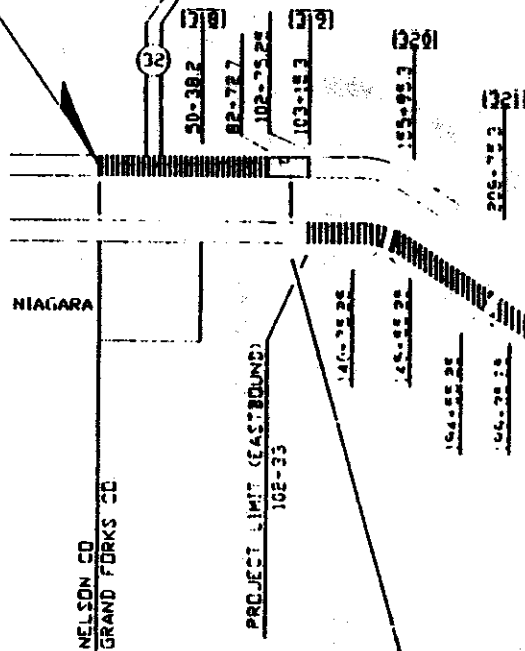
DIST.	STATE	FED. AID PROJ. NO.	SHEET NO.
B	N.D.	NH-6-002(039)318	4

SCOPE OF WORK (Milling)

- Section 1 2 - 2' (Average) Milling
- Section 3A - Selective Milling Determined by Field Engineer

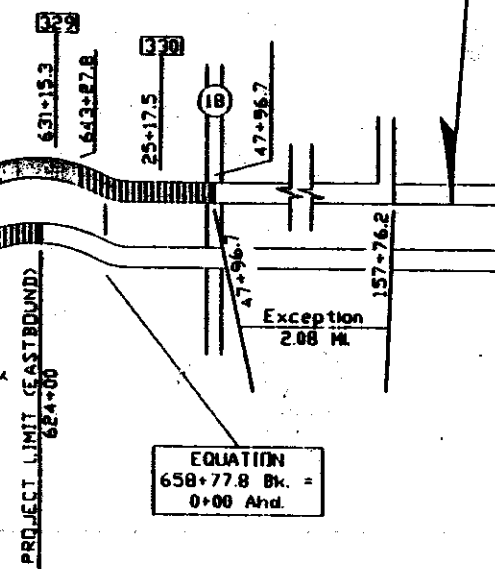
Reg. Proj. NH-6-002(039) (Westbound)

Sta. 649+88.3 Bk. = 0+00 Ahd.



EQUATION
98+35.4 Bk. =
98+32.5 Ahd.

End Proj. NH-6-002(039) (Westbound)
Sta. 164+60.2






EQUATION
658+77.8 Bk. =
0+00 Ahd.

S.N. R.R. Crossing
557+89.8

Exception
2.08 M

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
6	N.D.	NH -6-002(039)318	5

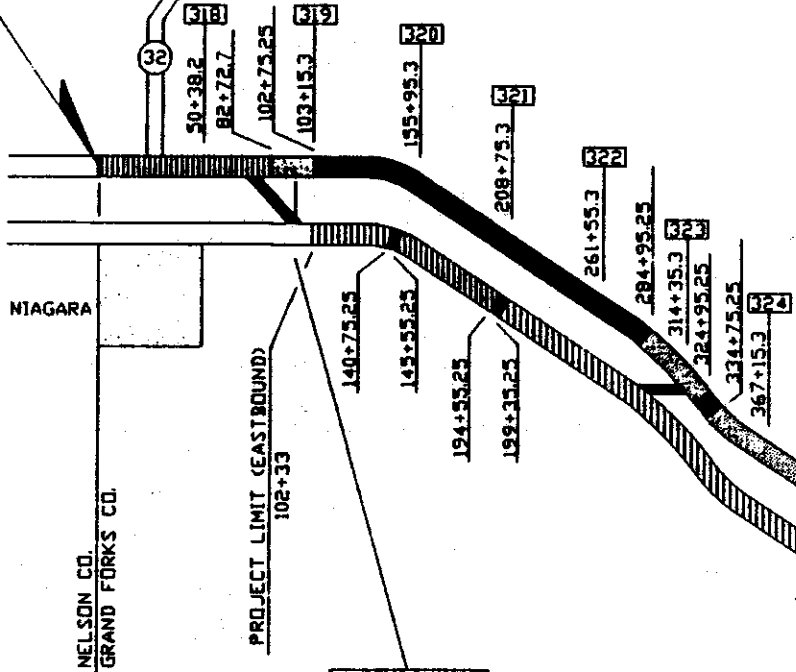
SCOPE OF WORK
(Surfacing)

-  — Section 1, 2A
-  — Section 3A
-  — Section 2B, 3B, 3C, 3D



Reg. Proj. F-6-002(039) (Westbound)

Sta. 649+08.3 Bk. = 0+00 Ahd.



EQUATION
98+35.4 Bk. =
98+32.5 Ahd.

B.N. R.R. Crossing
557+89.8

End Proj. NH-6-002(039) (Westbound)
Sta. 164+60.2

EQUATION
658+77.8 Bk. =
0+00 Ahd.

NOTES

FWSA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	NH-6-002(039)318	6

Revised 4-14-82

100 WORK SCHEDULE: In order to minimize interference with traffic
020 operations, the paving operation on the eastbound roadway shall be
completed before any westbound traffic may be detoured on the eastbound
roadway.

100 MEDIAN DRAINAGE: The contractor shall maintain and restore the
200 existing median drainage throughout the project. Should any pooling
occur, the contractor shall provide sufficient temporary pumping or
drainage to keep the median drained to the satisfaction of the
engineer. The cost for maintaining the median drainage shall be
incidental to the price bid for other items.

100 RAILWAY PROTECTION INSURANCE: Insurance policies for Railway
500 Protection Insurance as required by Section 107.06 shall be obtained by
the Contractor at Station 557+89.8 for protection of the Burlington
Northern Railroad.

100 DISPOSAL: Disposal of any material on the right of way shall be
P01 allowed only as approved and directed by the engineer.

203 SUBGRADE REPAIR LOCATIONS (SECTIONS (2B), (3B), (3C), & (3D)): The
P02 engineer in the field will determine actual location and depth of
subcut based on existing conditions. The existing topsoil shall be
stripped to a depth not greater than six inches on that portion of the
slopes that will be disturbed by the placement of subgrade material.
The topsoil shall be stockpiled, and replaced when the work is
completed. The subgrade material shall be placed in horizontal layers,
not to exceed six to eight inches (loose measurement), on the
inslopes. The exposed surface below the subcut shall be scarified
six inches, shaped, and compacted. Compaction and density control
shall be in accordance with Section 203.02 f as determined by
AASHTO T-180. Aggregate Base Cl. 3 shall be compacted in accordance
with Section 302.04F.1 (Ordinary Compaction). The unit price bid for
"Common Excavation - Subcut" shall include all costs for removing and
placing subgrade material on the inslopes, for scarifying and
compacting the six inches of material below the subcut, removal,
replacement, and stockpiling the topsoil, and seeding of all disturbed
areas. The unit price bid for "Aggregate for Subgrade Repair, Class 3"
will be full compensation for all labor, equipment, and materials
necessary to complete the work as specified. Cost for any additional
subcut and backfill will be paid for at the contract unit price bid for
"Common Excavation - Subcut" and "Aggregate for Subgrade Repair, Class
3."

203 SUBGRADE REPAIR LOCATIONS (SECTIONS (2B), (3B), (3C), & (3D)): The
P03 contractor should be aware that a large quantity of rocks will be
encountered in the subcut areas. The contractor shall dispose of this
rock. The contractor will be able to dispose of this rock in the
borrow area he uses. The cost for removal and disposal of this rock
shall be included in the unit price bid for "Common Excavation -
Subcut."

203 BORROW: There is a high potential of archaeological sites being
P04 present in this area. If the contractor elects to obtain embankment
material from an area other than the area designated on these plans,
the contractor must obtain NDDOT approval. Whether the contractor's
proposed area is within the existing right of way or outside the
existing right of way, the contractor shall follow the procedure
required by Supplemental Specification 107.04B.

230 LEFT TURN-LANE CONSTRUCTION: The cost of labor, equipment,
P03 and materials to perform the following work will be included in the
price bid for "Left Turn-Lane Construction."

- 1) Strip and stockpile 3" of topsoil from the embankment and
excavation areas.
- 2) The material used to construct the turn lane will be compacted
in accordance with Section 203.02H of the Standard Specification.
When available, the embankment material may be obtained within the
right of way in locations approved by the engineer.
- 3) Replace the topsoil on both the excavation and embankment
areas and seed with Class II seed mixture in accordance with
Section 708.02 of the Standard Specifications.

Payment will be made for each turn lane that is constructed.

302 AGGREGATE BASE COURSE, CLASS 5 (SECTION (3C)): This note refers only
P01 to the Aggregate Base Course, Class 5 in the test section. All but
1000 feet of Aggregate Base Course, Class 5 should be primed with
MC-70, 250 Liquid Asphalt or SP-6 Emulsified Asphalt at a rate of
.35 gallons per square yard. This test section and the primed and
unprimed Aggregate Base Course, Class 5 shall be marked with delineator
posts specifying the different areas. The cost for priming the
Aggregate Base Course, Class 5 will be paid for at the contract unit
price per gallon for "MC-70, 250 Liquid Asphalt or SP-6 Emulsified
Asphalt". The cost for supplying and installation of the delineator post
shall be incidental to the price bid for other items.

302 REMOVE AND SALVAGE AGGREGATE BASE COURSE: This item of work shall
P02 consist of removing and stockpiling the existing aggregate and asphalt
cement treated base. The contractor shall prevent the material from
being contaminated by the removal and stockpiling operation. Cost for
removing, hauling, and stockpiling shall be included in the unit price
bid for "Remove and Salvage Aggregate Base Course."

302 SALVAGED BASE COURSE (SECTIONS (2B), (3B), (3C), & (3D)): The
P03 salvaged aggregate base course shall be deposited, spread, shaped, and
compacted in accordance with Section 302. The unit price bid for
"Salvaged Aggregate Base Course" shall be full compensation for all
labor, equipment, and materials necessary to complete the work as
specified.

NOTES

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
6	N.D.	NH-6-002(039)318	7

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405 REMOVE AND SALVAGE BITUMINOUS SURFACING: This item of work shall consist of removing and stockpiling the bituminous material from the subcut areas for recycled hot bituminous pavement. The contractor shall prevent the material from being contaminated by the removal and stockpiling operation. Cost for removing, hauling, and stockpiling shall be included in the unit price bid for "Remove and Salvage Bituminous Surfacing."

407 RECYCLED HOT BITUMINOUS PAVEMENT - LARGE STONE (SECTIONS 3A, 3B, 3C, P01 & 3D): The "Recycled Hot Bituminous Pavement - Large Stone" shall be paver laid in two approximately equal lifts.

407 RECYCLED HOT BITUMINOUS PAVEMENT - CLASS 37 (SECTIONS 1, 2A): The P02 "Recycled Hot Bituminous Pavement - Class 37" shall be paver laid in one lift.

407 RECYCLED HOT BITUMINOUS PAVEMENT - CLASS 37 (SECTIONS 2B, 3A, P03 3B, 3C, & 3D): The "Recycled Hot Bituminous Pavement - Class 37" shall be paver laid in two approximately equal lifts.

408 HOT BITUMINOUS PAVEMENT - CLASS 33: The 3" hot bituminous pavement P01 shall be paver laid in one lift. The 5" hot bituminous pavement shall be paver laid in two approximately equal lifts.

408 HOT BITUMINOUS PAVEMENT - CLASS 33: The placement of the Hot P02 Bituminous Pavement - Class 33 shall not exceed more than five miles in front of the placement of the Recycled Hot Bituminous Pavement - Class 37 on both shoulders.

408 HOT BITUMINOUS PAVEMENT - CLASS 33: The hot bituminous pavement at P03 the beginning and end of the project on both roadways shall be tapered down to meet the existing roadway as directed by the field engineer.

410 MILLING BITUMINOUS PAVEMENT (SECTIONS 1, 2, 3A): The contractor P01 has the option of evening up the milling lanes at the end of each day's milling operation or signing for the uneven pavement and providing the following devices: Install "Uneven Pavement" signs (Sign W21-14-48) and a supplemental plate (Sign W20-52-54) identifying the distance on the right shoulder (both directions) at the beginning of the uneven pavement and at major intersections. A major intersection shall be defined as a FAS, State, U.S., or Interstate ramp. Install "Do Not Pass" signs (Sign No. R4-1-48) on the right shoulder (both directions) at the beginning of the uneven pavement and at major intersections. Install tubular markers at 200 foot intervals. Devices shall be left in place until the other lane is brought up even. If the contractor is unable to bring both paving lanes up even at the end of the day, he will sign the uneven pavement as specified above.

These signs will not be counted and paid for separately. The cost to supply, maintain, install, and remove the traffic control devices required for uneven pavement lanes shall be included in the amount bid for other items.

410 MILLING BITUMINOUS PAVEMENT: The material shall be salvaged for P02 Recycled Hot Bituminous Pavement (Class 37), and Recycled Hot bituminous Pavement (Large Stone). The contractor shall mill half of the existing roadway while maintaining traffic on the other half. The quantity (23,117 tons) for Sections 1 and 2 is based on the depth and width shown on the typical sections for the entire length of the sections. The quantity (5,682 tons) for Section 3A is based on a depth of 1" and a width of 28.5' for the entire length of the section. Any milled material remain after the project is complete shall become the property of the contractor and disposed of, as approved by the field engineer. The unit price bid for "Milling Bituminous Pavement" shall be considered full compensation for removing, hauling stockpiling and disposal of the milled material.

The contractor is also required to drain and pay all cost to drain any areas with standing water.

410 PREPARE STOCKPILE SITE: The lump sum bid for "Prepare Stockpile Site" P03 shall be full payment for the required site preparation and restoration regardless of the number of sites used. If the contractor uses additional sites for his operation, these sites shall be at this own expense. All stockpiled material shall become the property of the contractor after the project has been completed. The contractor shall remove his property from the stockpile site upon completion of this project.

704 TRAFFIC CONTROL FOR BITUMINOUS SURFACING: The contractor has 254 the option of evening up the paving lanes at the end of each day's paving operation or signing for the uneven pavement and providing the following devices: Install "Uneven Pavement" signs (Sign No. W21-14-48) and a supplemental plate (Sign No. W20-52-54) identifying the distance on the right shoulder (both directions) at the beginning of the uneven pavement and at major intersections. A major intersection shall be defined as a FAS, State, U.S., or Interstate ramp. Install "Do Not Pass" signs (Sign No. R4-1-48) on the right shoulder (both directions) at the beginning of the uneven pavement and at major intersections. Install tubular markers at 200 foot intervals devices shall be left in place until the other lane is brought up even. These signs and tubular markers will not be counted and paid for separately. The cost to supply, maintain, install, and remove the traffic control devices required for uneven pavement lanes shall be included in the amount bid for other items.

704 FLAGS FOR DIAMOND WARNING SIGNS: The requirement for flags on 550 diamond warning signs has been eliminated. The contractor is not required to provide these flags or install them as per the standard drawings for construction signing.

						FYMA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
						8	N.D.	MI-6-002(039)318	10
						QUANTITIES			
SPEC	CODE	ITEM DESCRIPTION	UNIT	EASTBOUND MAINLINE	WESTBOUND MAINLINE	S.L. (12) P.D. (8)	Revised 4-14-02 MEDIAN X-OVERS & TURN LANES	TOTAL	
103	0100	Contract Bond	L. Sum	1				1	
107	0100	Railroad Protection Insurance	L. Sum	1				1	
201	0330	Clearing and Grubbing	L. Sum	1				1	
203	0138	Common Excavation - Subcut	Cu. Yd.	1,972	54,305		2,776	59,053	
203	0140	Borrow	Cu. Yd.				3,282	3,282	
203	0204	Flatten Ditch Block Slopes	Ea.	1				1	
216	0100	Water	M Gal.	338	2,646		23	3,007	
230	0108	Approach Inslope Reconstruction	Ea.	43	28			71	
230	0130	Left Turn-Lane Construction	Ea.	1				1	
302	0100	Salvaged Base Course	Ton	1,190	22,211			23,401	
302	0120	Aggregate Base Course, Class 5	Ton	1,490	29,362		710	31,562	
302	0235	Aggregate for Subgrade Repair, Class 3	Ton	2,080	46,737			48,817	
302	0420	Remove and Salvage Aggr. Base Course	Ton	767	23,659			24,426	
401	0103	MC-70, 250 Liquid Asph. or SP-6 Emuls. Asph.	Gal.	1,662	47,365		796	49,823	
401	0152	SS-1h or CSS-1h Emuls. Asphalt	Gal.	12,651	29,238	216	1,161	43,266	
401	0160	Blotter Material	Ton	17	318			335	
405	0110	Remove and Salvage Bituminous Surfacing	Ton	1,000	12,675			13,675	
407	0120	Prepare Stockpile Site	L. Sum	1				1	
407	0220	Recycled Hot Bit. Pymt. - Class 37	Ton	12,563	14,935			27,498	
407	0222	Recycled Hot Bit. Pymt. - Large Stone Mix	Ton		46,301			46,301	
407	0226	120-150 Asphalt Cement	Ton	163	194			357	
407	0227	200-300 Asphalt Cement	Ton		695			695	

QUANTITIES						FED. AID PROJ. NO.	SHEET NO.	
						8 N.D.	11	
SPEC	CODE	ITEM DESCRIPTION	UNIT	EASTBOUND MAINLINE	WESTBOUND MAINLINE	S.L. (12) P.O. (8)	MEDIAN X-OVERS & TURN LANES	TOTAL
407	0465	Virgin Aggregate - Class 37	Ton	4,960	5,896			10,856
407	0470	Virgin Aggregate - Large Stone Mix	Ton		22,803			22,803
407	9010	Core Samples (Bit. Pmnt.)	Ea.		224			224
408	0190	Hot Bit. Pmnt. Class 33	Ton	22,825	6,136	684	2,051	31,696
408	0320	120-150 Asphalt Cement	Ton	1,370	368	41	123	1,902
408	0390	AC-20 Asphalt Cement or 60-70 Pen. A.C.	Ton		41			41
408	0400	Permeable Asphalt Stabilized Base (PASB)	Ton		2,023			2,023
408	1300	Plant Mix Seal - Cover Coat	Ton		7,950			7,950
408	9054	Polymer Modified Asphalt Cement	Ton		596			596
408	9605	Core Samples (Bit. Pmnt.)	Ea.	216	74			290
410	0100	Milling Bituminous Pavement	Ton	12,114	11,349		484	28,947
602	1131	Class AE-3 Concrete Box Culvert	Cu. Yd.	99				99
612	0115	Reinforcing Steel Grade	Lbs.	11,259				11,259
702	0100	Mobilization	L. Sum	1				1
704	0100	Flagging	M. Hr.	512	688			1,200
704	0105	Obiteration of Pavement Marking	L. Ft.	2,380				2,380
704	1000	Traffic Control Signs	Unit	4,014				4,014
704	1052	Type III Barricade	Ea.	34				34
704	1060	Delineator Drums	Ea.	308				308
704	1072	Flexible Delineators	Ea.	26				26
704	1081	Vertical Panels (Back to Back)	Ea.	16				16

QUANTITIES						FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
						8	N.D.	NH-6-002(039)318	12
SPEC	CODE	ITEM DESCRIPTION	UNIT	EASTBOUND MAINLINE	WESTBOUND MAINLINE	S.L. (12) P.D. (8)	MEDIAN X-OVERS & TURN LANES		TOTAL
704	1087	Sequencing Arrow Panel - Type C	Ea.	3					3
704	1185	Pilot Car	Hrs.	140	266				406
706	0300	Field Laboratory - Type C	Ea.	1					1
708	1020	Riprap Loose Rock	Cu. Yd.	10	5				15
708	2240	Seeding, Type B, Class II	Acre	1	104			1	106
710	0300	Removal of Bypass	L. Sum	1					1
714	0400	Pipe, Concrete Reinforced 21 In. - Cl. III	L. Ft.	28					28
714	0705	Pipe, Concrete Reinforced 27 In. - Cl. III	L. Ft.	6					6
714	1210	Pipe, Concrete Reinforced 54 In. - Cl. III	L. Ft.	4					4
714	3025	End Section, Concrete Reinforced 27 In.	Ea.	2					2
714	5015	Pipe Corrugated Steel .064 In., 18 In.	L. Ft.	130	55				185
714	5035	Pipe Corrugated Steel .064 In., 24 In.	L. Ft.	30	24				54
714	5810	End Section Corrugated Steel .064 In., 18 In.	Ea.	3					3
714	5825	End Section, Corrugated Steel .079 In., 30 In.	Ea.	4					4
714	7025	Pipe, PVC 8 In.	L. Ft.					1,800	1,800
714	9200	Cattle Pass Concrete Intermediate Section	L. Ft.	16					16
714	9660	Remove and Relay End Section - All Types & Sizes	Ea.	27	6				33
714	9720	Underdrain, Pipe PVC Perforated 4 In.	L. Ft.		10,560				10,560
714	9770	Underdrain, Pipe PVC Non-Perforated 4 In.	L. Ft.		320				320
754	0116	Flat Sheet for Signs - Type 2 Refl. Sheeting	Sq. Ft.	164					164
754	0117	Flat Sheet for Signs - Type 3A Refl. Sheeting	Sq. Ft.	240					240
754	0195	Diamond Grade Delineators Type A	Ea.	279					279
754	0209	Steel Galv. Posts - Square Tube Perforated	Lb.	3,366					3,366

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	W-6-002(039)318	13

QUANTITIES

<u>SPEC</u>	<u>CODE</u>	<u>ITEM DESCRIPTION</u>	<u>UNIT</u>	<u>EASTBOUND MAINLINE</u>	<u>WESTBOUND MAINLINE</u>	<u>S.L. (12) P.D. (8)</u>	<u>MEDIAN X-OVERS & TURN LANES</u>	<u>TOTAL</u>
754	0557	Interstate Mile Posts - Type C	Ea.	23				23
754	0592	Reset Sign Panel	Ea.	6				6
754	0593	Reset Sign Support	Ea.	4				4
762	0102	Pavement Marking Painted Line	L. Ft.	234,000	318,000		1,730	554,530
762	0103	Pavement Marking Painted Message	Sq. Ft.				198	198
762	0128	Plastic Pavement Marking Film Message	Sq. Ft.	274	274			548
762	0140	Temporary Stripe - Broken Line (Painted, Tape, or Raised Markers)	L. Ft.	10,503	18,971			29,474
762	0200	Raised Pavement Markers	Ea.	1,087				1,087
764	0115	Three-Cable Guardrail	L. Ft.	1,913				1,913
764	0151	Remove Beam Guardrail and Posts	L. Ft.	550				550
764	1495	Adjust Guardrail	L. Ft.	788				788
920	1212	Geotextile Separation Fabric	Sq. Yd.		18,480			18,480
950	0100	Trainee	M Hr.	1,000	1,000			2,000

BASIS OF ESTIMATE														FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.	
														8	N.D.	NH-6-002(039)318	14	
DESCRIPTION	UNIT	(1)	(2A)	QUANTITY PER MILE	WIDTH	(3A)	QUANTITY PER STA.	WIDTH	(2B)	QUANTITY PER MILE	WIDTH	(3B)	QUANTITY PER STA.	WIDTH	(3C)	QUANTITY PER STA.	WIDTH	(3D)
		QUANTITY PER MILE	QUANTITY PER MILE			QUANTITY PER STA.			QUANTITY PER MILE			QUANTITY PER STA.			QUANTITY PER STA.			QUANTITY PER STA.
Water for Dust Palliative and Subgrade Preparation and Aggregate Base Course - Cl. 5 at 20 Gal./Ton	M Gal.	25		44			.95			50			.95			.5		
Aggregate Base Course - Cl. 5 @ 1.875 Ton/C.Y. (Shoulders)	Ton			940	6.0'-6.0'													
MC-70, 250 Liquid or SP-6 Emuls. Asph. for Prime Coat @ .35 Gal./S.Y. (Top of Aggregate Base)	Gal.			2,238	8.9'-2.0'		173.1	44.5'		8,419	41.0'		29.2	4.0'-3.5'		171.1	44'	
Blotter Material Cl. 44 @ 12 lbs./S.Y. (Prime Coat Maintenance)	Ton						1.8	27'		95	27'					1.8	27'	
SS-1h or CSS-1h Emul. Asph. for Tack Coat @ 0.05 Gal./S.Y. (Top of Prime Coat and Asphalt Stabilized Base)	Gal.			320	8.9'-2.0'		22	40.2'		1,203	41.0'		22.0	39.7'		22	39.4'	
SS-1h or CSS-1h Emul. Asph. for Tack Coat @ 0.05 Gal./S.Y. (Between Courses)	Gal.			241	8.2'		22	40.2'		1,138	38.8'		20.3	36.5'		21.1	38'	
SS-1h or CSS-1h Emul. Asph. for Tack Coat @ 0.05 Gal./S.Y. (Top of Milled Surface and Existing Bit. Surface)	Gal.	1,261	43'	836	28.5'													

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
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DESIGN DATA
 Current Traffic (1991)
 Forecast Traffic (2011)
 Traffic Classifications "M"

LOCATION: 1.5 Miles East of East Jct. MD 32 to 1.4 Miles West of Jct.
 MD 18 (Eastbound)

Traffic	Average Daily	Est. 30th Max. Hr.
Current 1992	1050 Pass. 250 Trucks 1300 Total	175
Forecast 2012	1575 Pass. 375 Trucks 1950 Total	265

LOCATION: 1.5 Miles East of East Jct. MD 32 to 1.4 Miles West of Jct.
 MD 18 (Westbound)

Traffic	Average Daily	Est. 30th Max. Hr.
Current 1991	1050 Pass. 250 Trucks 1300 Total	175
Forecast 2011	1575 Pass. 375 Trucks 1950 Total	265

Design Speed: 70 MPH

Minimum Sight Distance (Stopping): 850 L. F.

TEMPORARY STRIPING
TWO-LANE ROADWAY - BASIS OF ESTIMATE
PAVEMENT MARKING PAINTED, TAPE, OR RAISED MARKERS

Centerlines - Broken Lines - 528 L.F./Mi. = 29,474 L.F.

DIVIDED HIGHWAY - (2) ROADWAY(S) - BASIS OF ESTIMATE
PAVEMENT MARKING PAINTED LINES

Outside Edge Lines - 4 inch white - 10,560 L.F./Mi. = 247,000 L.F.
 Inside Edge Lines - 4 inch yellow - 10,560 L.F./Mi. = 247,000 L.F.
 Lane Lines - 4 inch white,
 10' lines, 30' skip - 2,640 L.F./Mi. = 61,800 L.F.

PLASTIC PAVEMENT MARKING FILM MESSAGES

(6) Only - 22 S.F./Ea. = 132 S.F.
 (6) Left or Right Turn Arrow = 66 S.F.
 (4) Railroad Cross (B) R's = 260 S.F.
 (6) Bands 288 S.F.

CURVE DATA

(Westbound)

Station	to	Station	Degree	Length	Trans. Length
PC 98+32.5	Ahd	PT 141+64.1	1°	4,331.6'	100'
PC 307+41.1		PT 320+68.1	1°03'	1,327.0'	100'
PC 374+79.3		PT 386+10.9	1°	1,131.6'	100'
PC 443+48.7		PT 472+55.4	1°	2,906.7'	100'
PC 546+16.0		PT 556+62.6	1°	1,046.6'	100'
PC 587+03.5		PT 614+01.8	1°	2,698.3'	100'
PC 627+66.7		PT 644+03.4	1°	1,636.7'	100'

(Eastbound)

Station	to	Station	Degree	Length	Trans. Length
PC 102+13.8		PT 141+45.5	1°	3,931.7'	100'
PC 242+61.4		PT 261+79.2	0°45'	1,917.8'	100'
PC 307+00.2		PT 320+30.35	1°02'51"	1,330.15'	100'
PC 374+51.1		PT 385+79.4	1°	1,128.3'	100'
PC 443+38.4		PT 472+45.1	1°	2,906.7'	100'
PC 546+23.9		PT 556+70.6	1°	1,046.7'	100'
PC 587+04.2		PT 614+02.5	1°	2,698.3'	100'

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8	N.D.	WI-6-002(039)318	17

Revised 4-13-92

INSTALL MAILBOX SUPPORTS

SPECIAL PROVISION

Mile Post No.	Type of Support	Mailbox Size	Plant Mix Seal	SP NO.
324	1 - Single	Large	Permeable Asphalt Stabilized Base	209 200

Description	MAXIMUM SIZE OF MATERIAL	
	Type of Material	Max. Size
Milled Bit. Surf. for Shoulders	Milled or Crushed	3/4"
Milled Bit. Surf. for Hot Bit. (Large Stone)	Milled or Crushed	1 1/2"

RECYCLED HOT BITUMINOUS PAVEMENT - LARGE STONE MIX 211
Trainee

VIRGIN AGGREGATE - LARGE STONE MIX: Virgin aggregate for recycled hot bit. pmt. - large stone mix shall meet the following requirements:

Sieve Size	Percent Passing
1 1/2 inch	100
1 inch	80-100
3/4 inch	40-85
1/2 inch	10-40
3/8 inch	0-15
No. 4	0-5

At least 95% of the total aggregate shall have two fractured faces. The maximum allowable shale content will be 5%. The maximum allowable L.A. abrasion will be 40%.

AGGREGATE FOR SUBGRADE REPAIR, CLASS 3: Aggregate for subgrade repair, Class 3 shall meet the following requirements:

Sieve Size	Percent Passing
3"	100%
No. 4	35-92
No. 30	20-50
No. 200	0-15

Maximum shale content 12%.

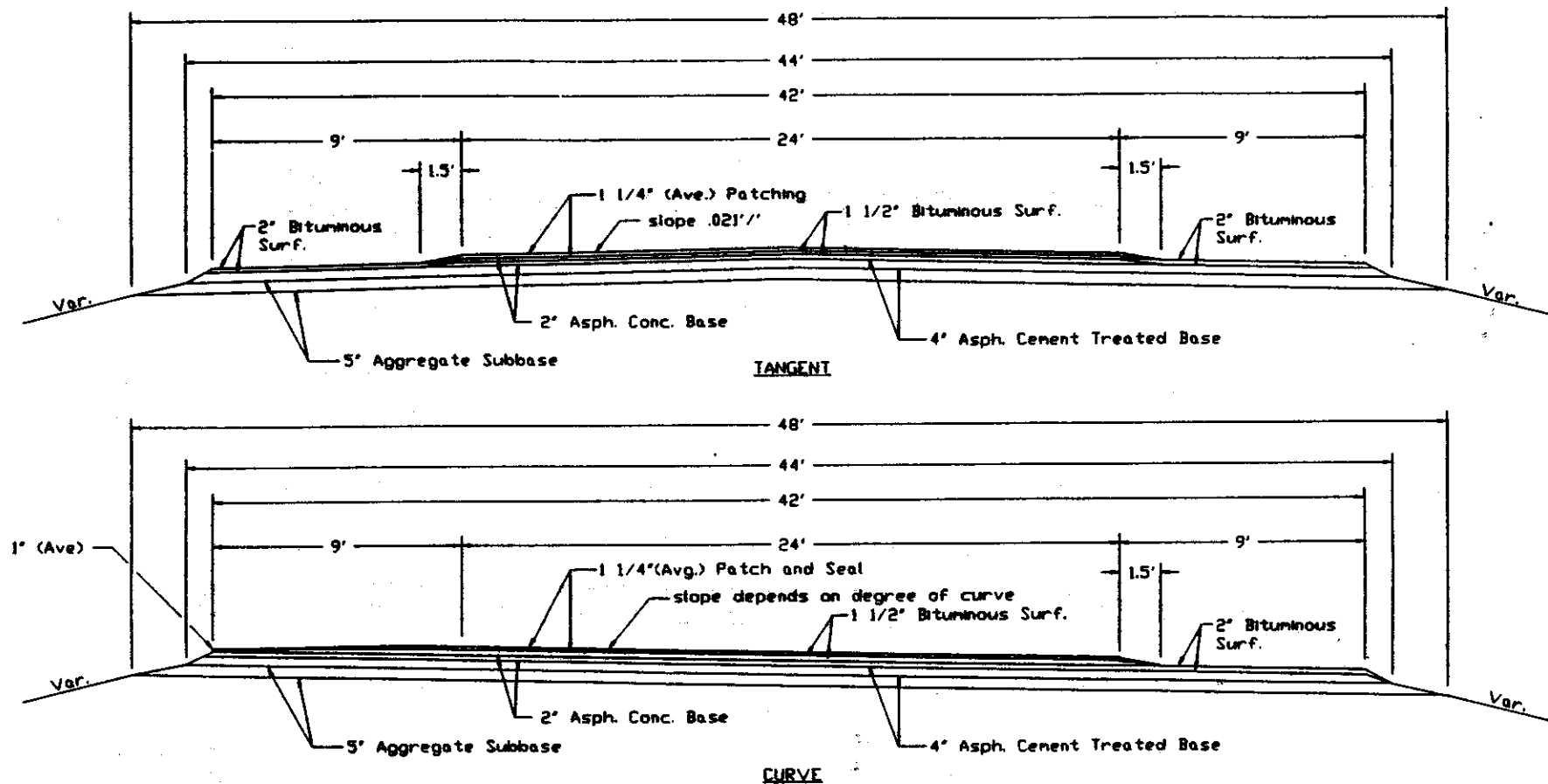
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
6	N.D.	NH-6-002(039)318	18

EXISTING TYPICAL SECTIONS

①

649+08.35 Bk. = 0+00 Ahd. to 82+72.7 (Westbound)
 385+79.4 to 624+00 (Eastbound)
 643+27.8 to 658+77.8 Bk. = (Westbound)
 0+00 Ahd. to 47+96.7 (Westbound)

NOTE: Typical section is reversed
 for Eastbound roadway

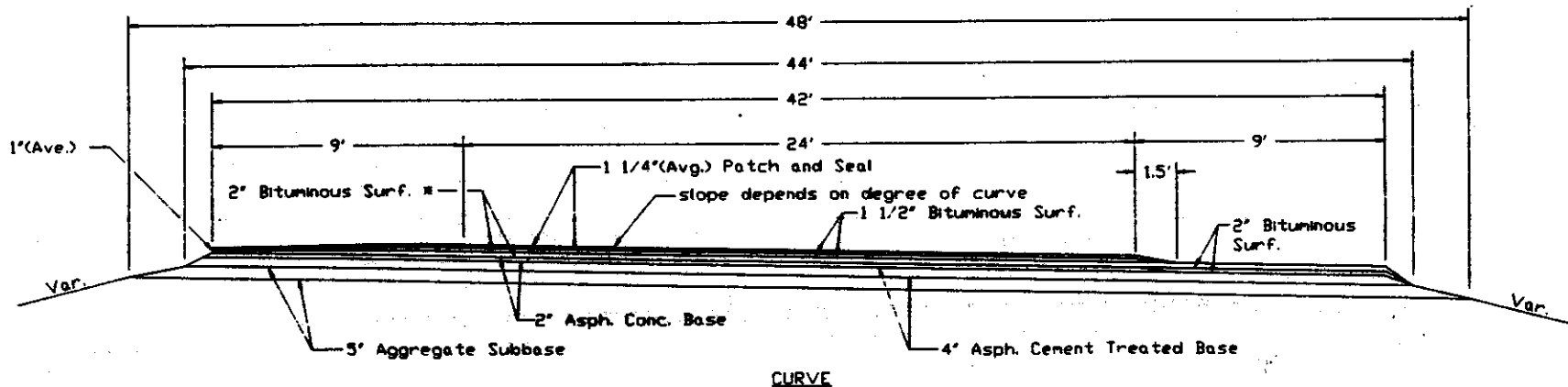
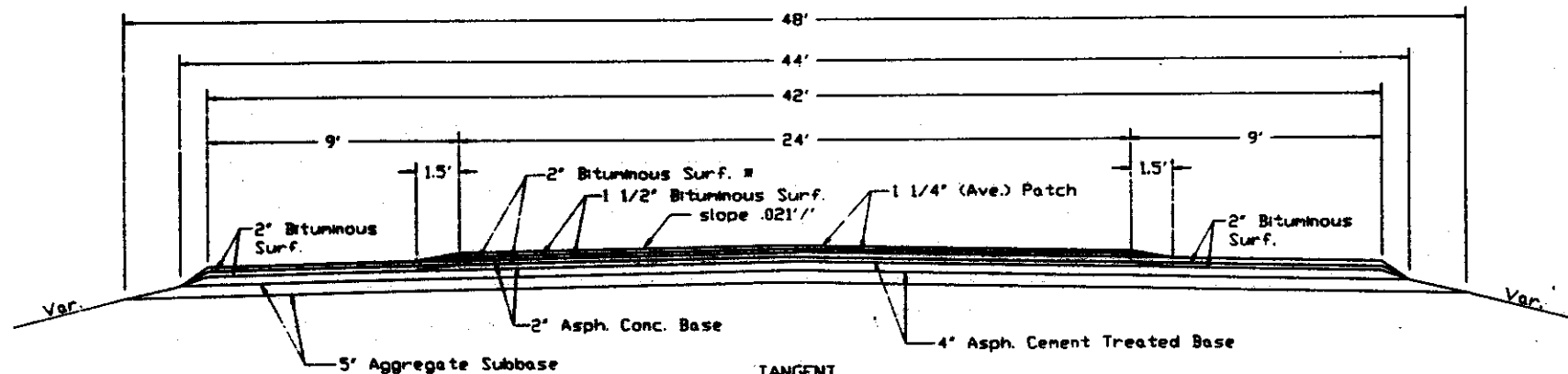


FHA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	NH-6-002(039)318	19

EXISTING TYPICAL SECTION

②

102+33 to 385+79.4 (Eastbound)



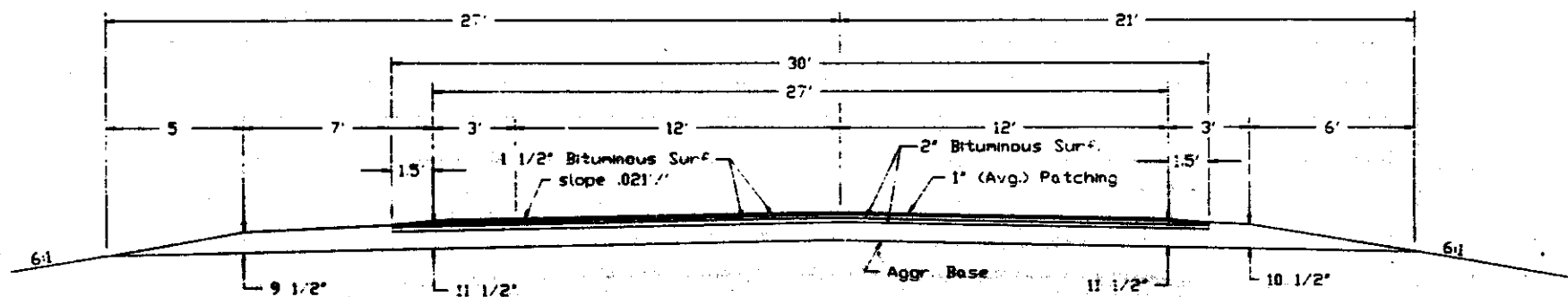
* 4" Bituminous Surfacing from
Sta. 191+50 to 200+00 and
Sta. 292+50 to 338+00

FHWA ROUTE	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	NH-6-002(039)318	20

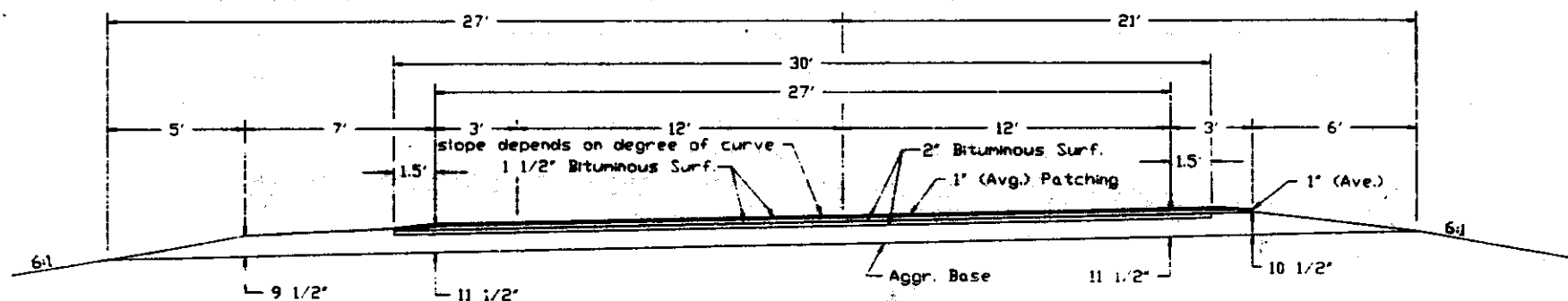
EXISTING TYPICAL SECTIONS

③

82+72.7 to 98+35.4 Bk. (Westbound)
98+32.5 Ahd to 643+27.8 (Westbound)



TANGENT



CURVE

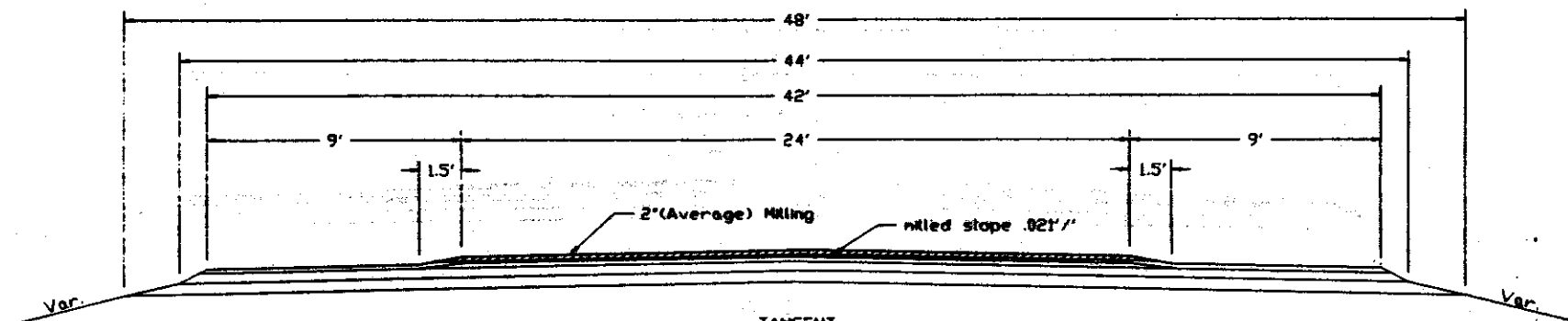
FHA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
6	N.D.	NH-6-002(039)318	21

TYPICAL MILLING SECTION

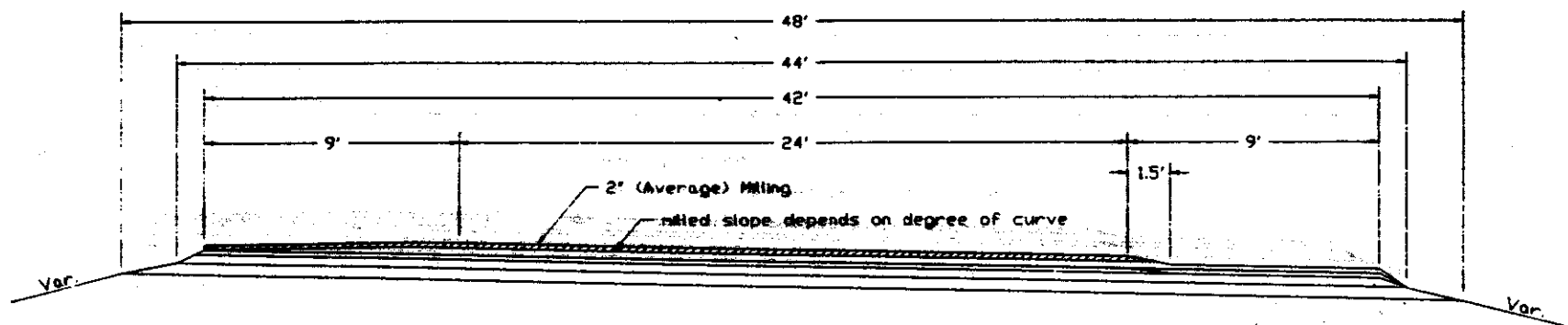
①

649+08.3 Bk. = 0+00 Ahd. to 82+72.7 (Vestbound)
 385+79.4 to 624+00 (Eastbound)
 643+27.8 to 658+77.8 Bk. (Vestbound)
 0+00 Ahd. to 47+96.7 (Vestbound)

NOTE: Typical section is reversed
 for Eastbound roadway



TANGENT

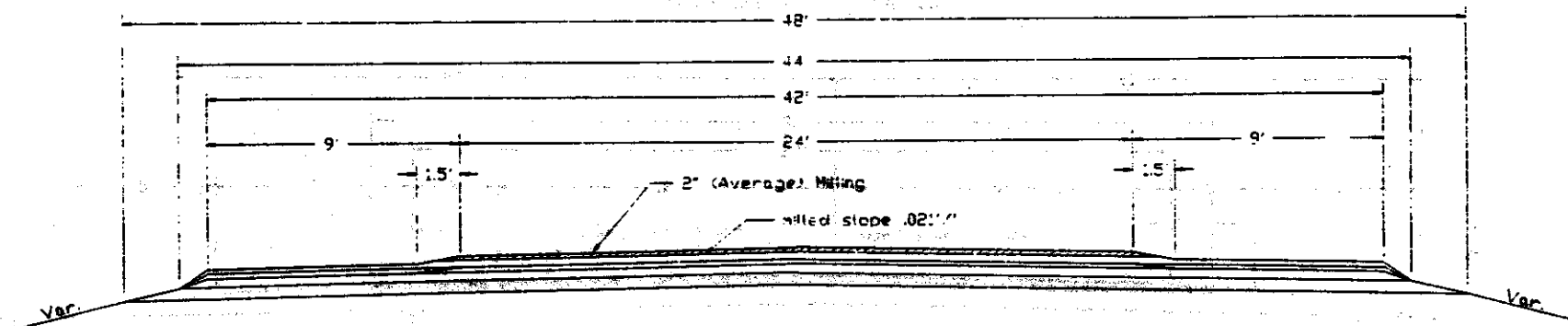


CURVE

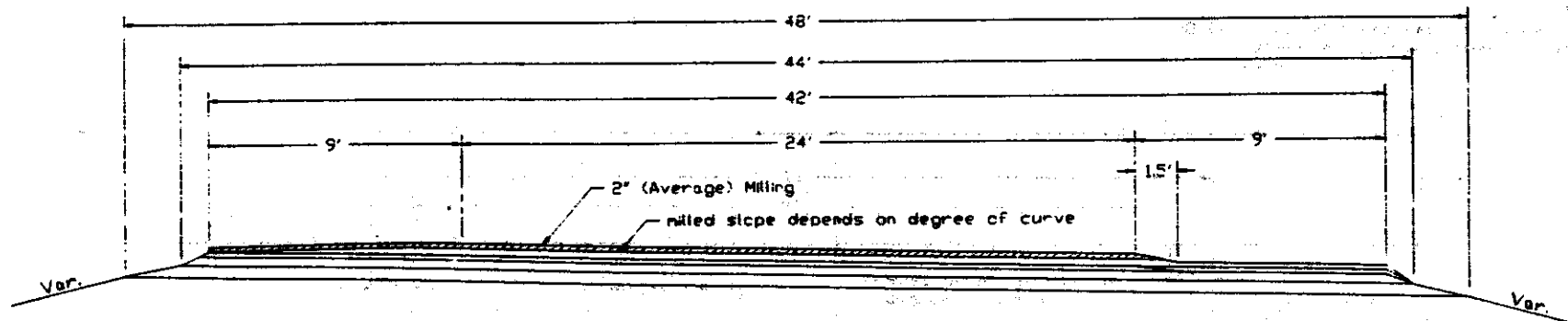
TYPICAL MILLING SECTION

(2)

102+33 to 385+79.4 (Eastbound)*



TANGENT



CURVE

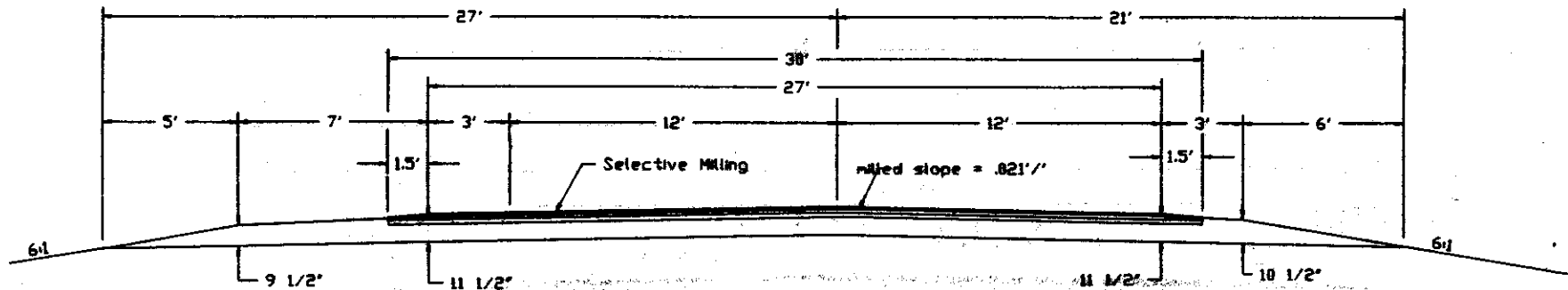
*Milling shall not be required from
Sta. 140+75.25 to 145+55.23 and
Sta. 194+55.25 to 199+35.24

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	NH-6-002(839)318	23

TYPICAL MILLING SECTIONS

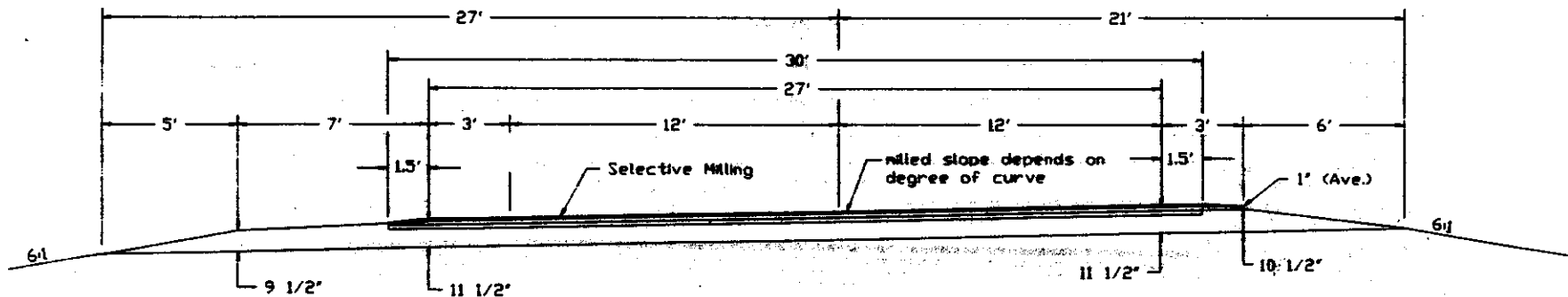
3A

82+72.7 to 98+35.4 Bk. (Westbound)
98+32.5 Ahd. to 643+27.8 (Westbound)



TANGENT

NOTE: Milling on these section will be determined by the Engineer in the field.



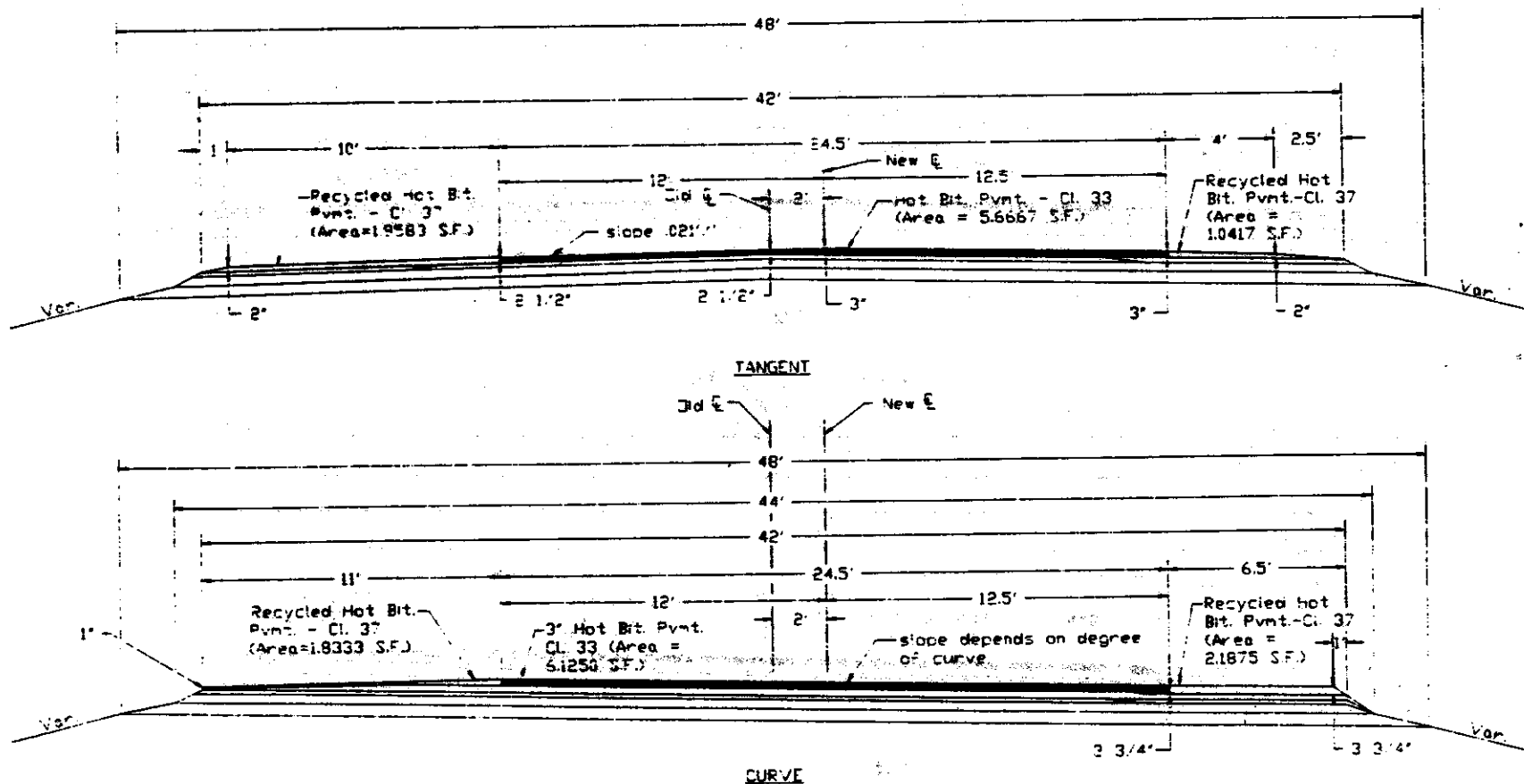
CURVE

TYPICAL SURFACING SECTION

1

649+08.35 Bk. = 0+00 And. to 82+72.7 (Westbound)
 385+75.4 to 624+00 (Eastbound)
 643+27.8 to 658+77.8 Bk. = (Westbound)
 0+00 And. to 47+96.7 (Westbound)

NOTE: Typical section is reverse
 for Eastbound roadway

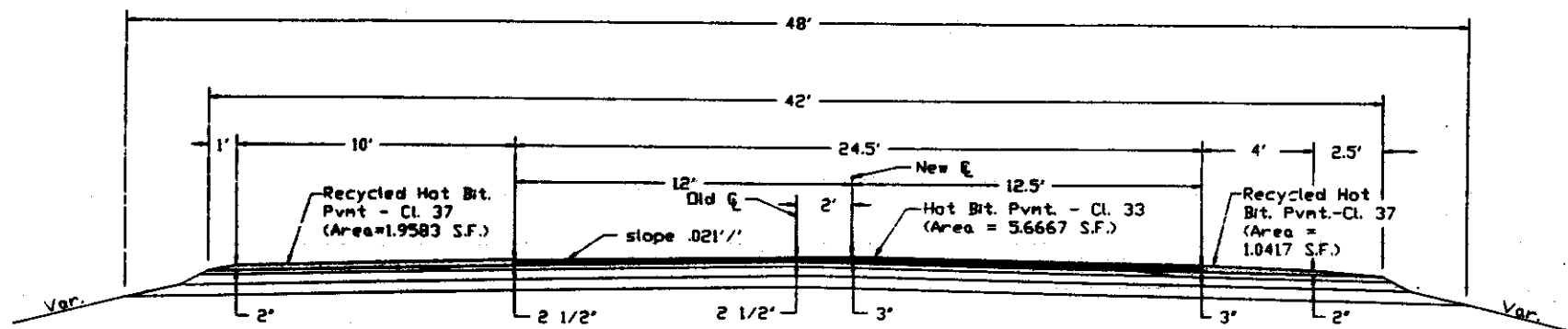


FHWA STATE REGION	FED. AID PROJ. NO.	SHEET NO.
8 N.D.	NH-6-002(039)318	25

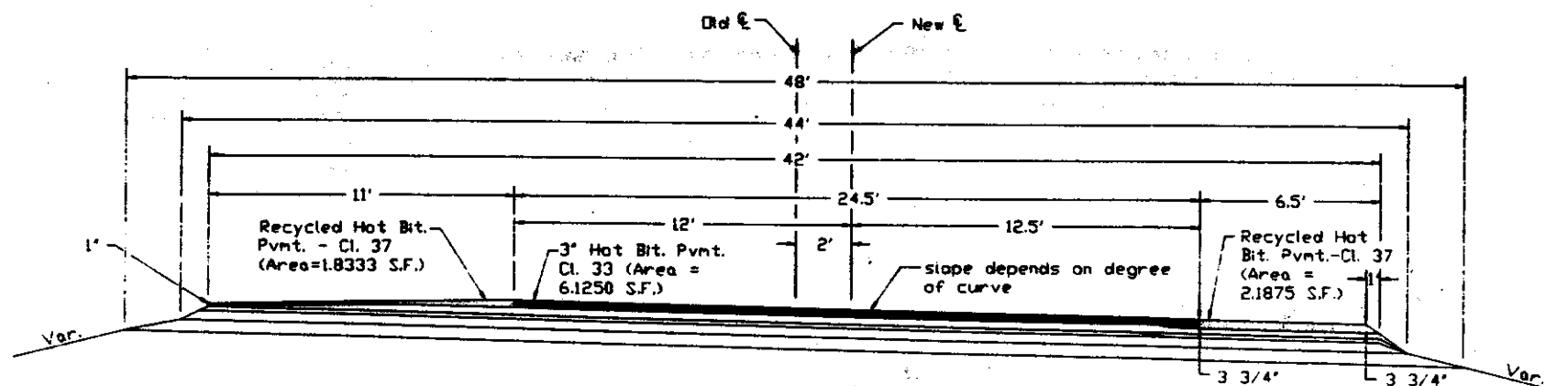
TYPICAL SURFACING SECTION

(2A)

102+33 to 140+75.2 (Eastbound)
 145+55.25 to 194+55.25 (Eastbound)
 199+35.25 to 385+79.4 (Eastbound)



TANGENT



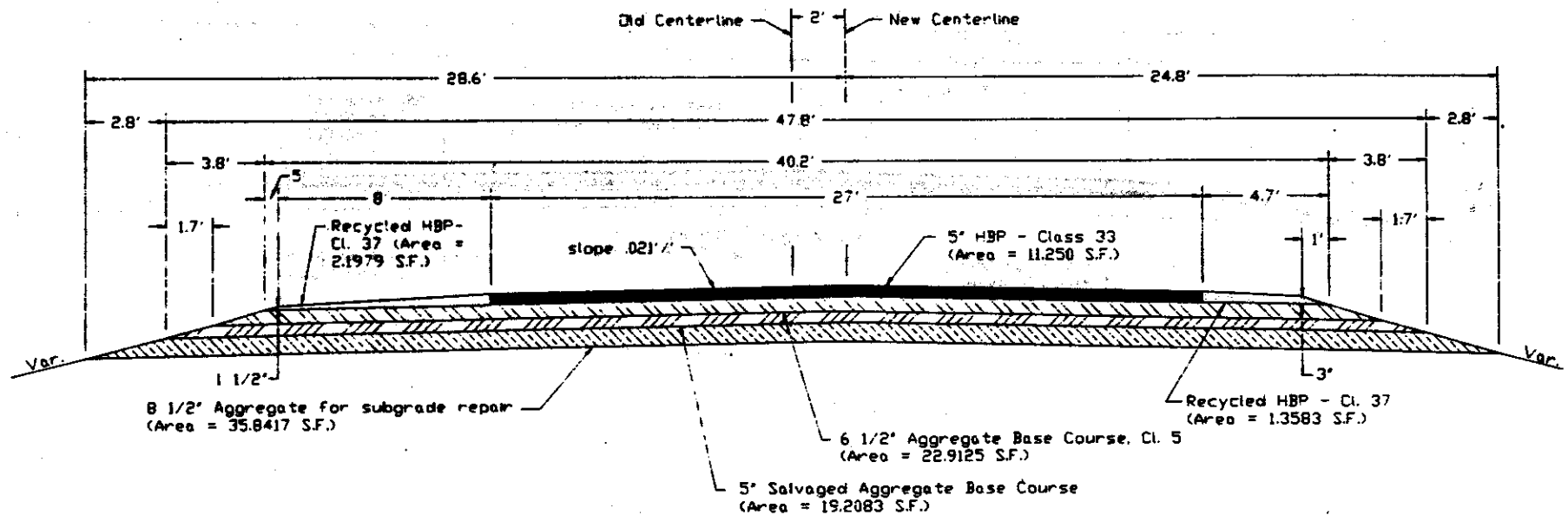
CURVE

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.H.	NH-6-002(039)318	26

TYPICAL SURFACING SECTION

(2B)

Sta. 140+75.25 to 145+55.25 (Eastbound)
Sta. 194+55.25 to 199+35.25 (Eastbound)



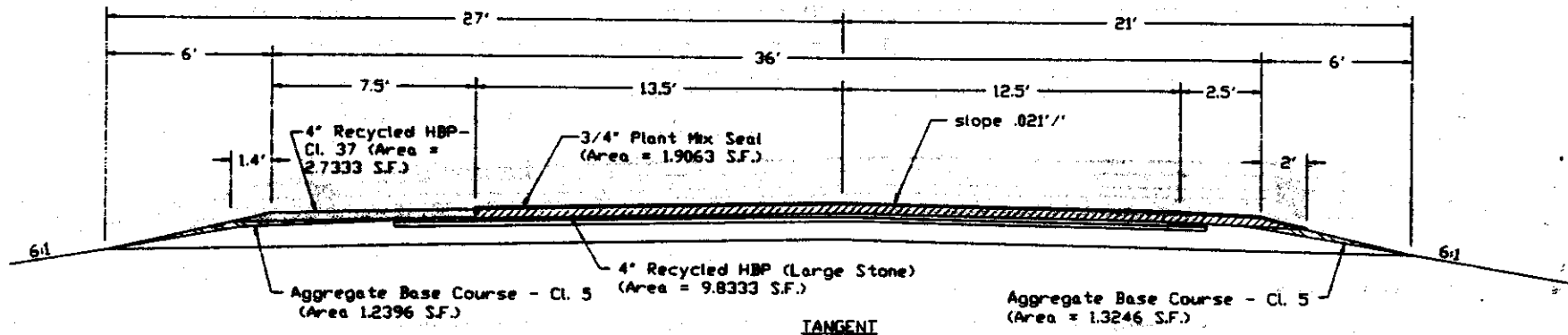
TANGENT

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	W-6-002(039)318	27

TYPICAL SURFACING SECTIONS

3A

82+72.7 to 98+35.4 Bk. (Westbound)
 98+32.5 Ahd. to 102+75.25 (Westbound)
 284+95.25 to 324+95.25 (Westbound)
 334+75.25 to 540+15.25 (Westbound)
 550+95.25 to 643+27.8 (Westbound)



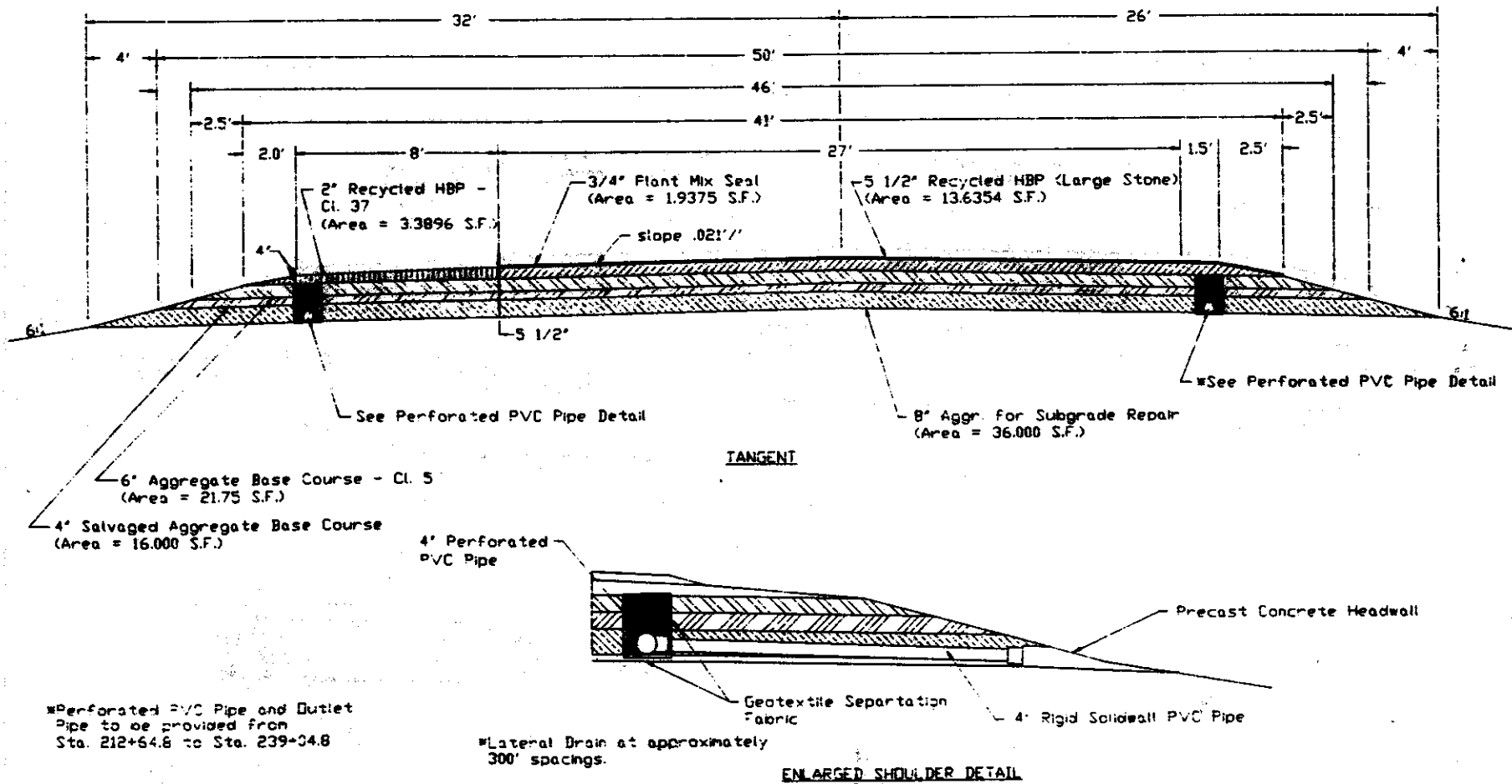
NOTE: Curve section same as tangent, except for superelevation.

TYPICAL SURFACING SECTION

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
6	N.D.	NH-6-002(039)318	20

(3B)

Sta. 102+75.25 to 239+04.8 (Westbound)
Sta. 265+44.8 to 284+95.25 (Westbound)

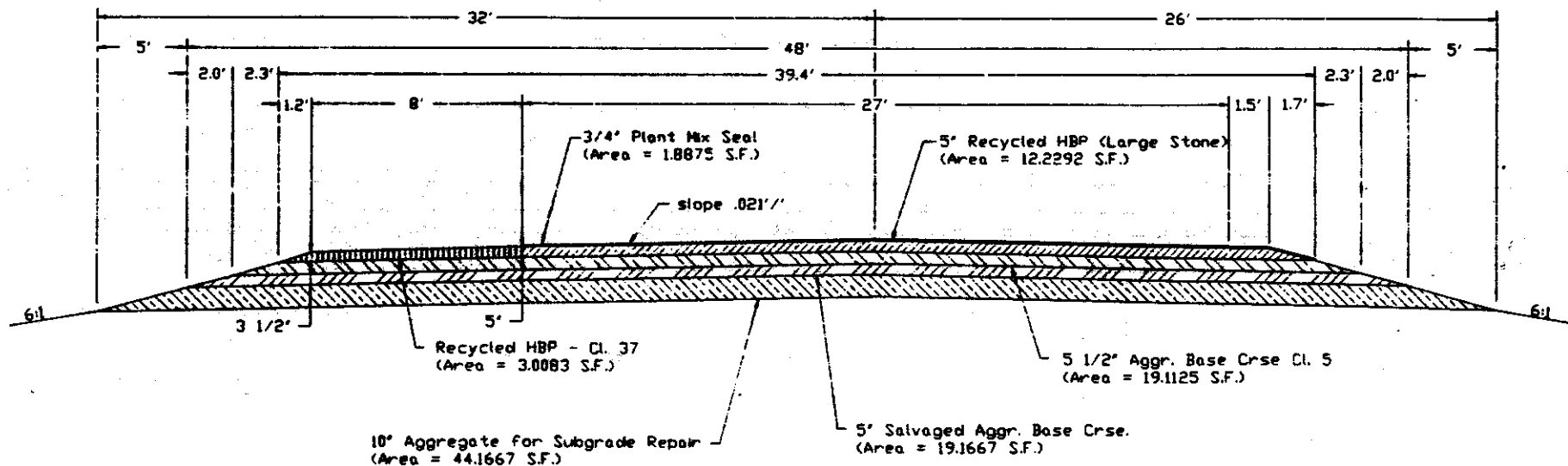


FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	NH-6-002(039)318	30

TYPICAL SURFACING SECTION

(30)

Sta. 324+95.25 to 334+75.25 (Westbound)
Sta. 540+15.25 to 550+95.25 (Westbound)



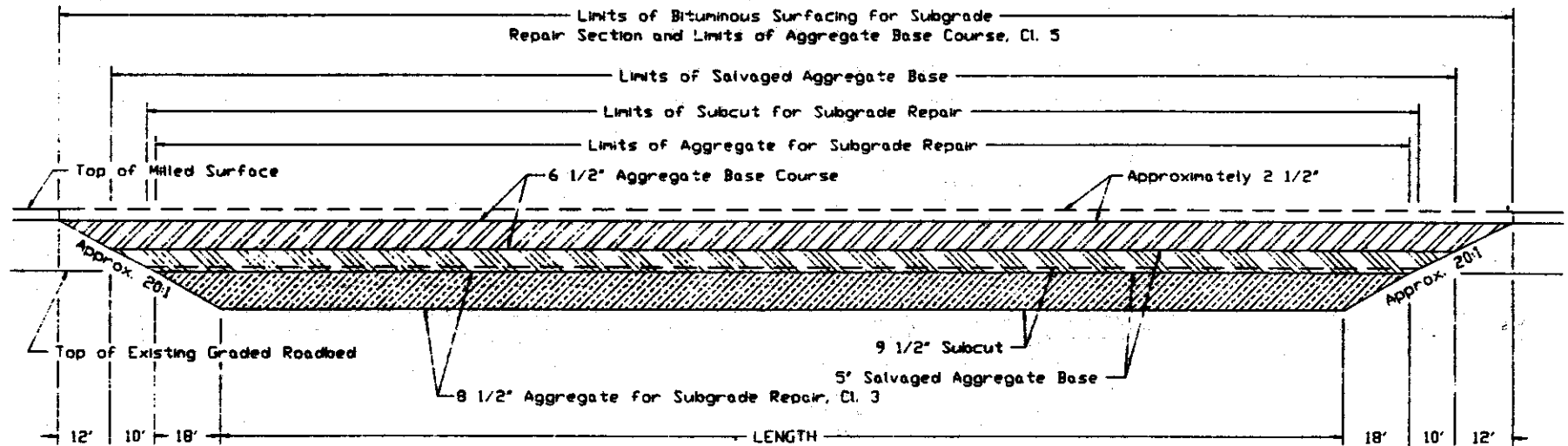
TANGENT

FHA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	NH-6-002(039)318	31

SUBGRADE REPAIR AREA

Sta. 140+75.25 to 145+55.25 (Eastbound)
Sta. 194+55.25 to 199+35.25 (Eastbound)

(28)

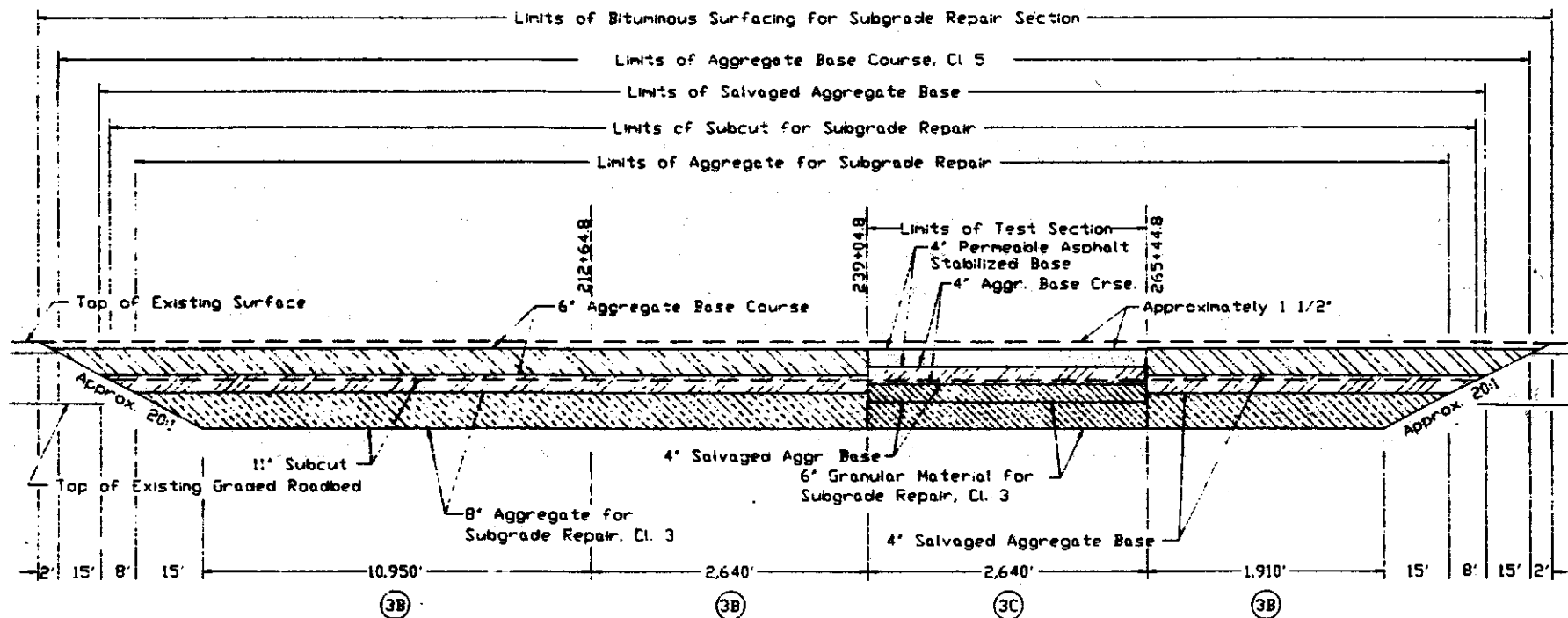


LONGITUDINAL PROFILE GRADE

SUBGRADE REPAIR AREA

Sta. 102+75.25 to 264+95.25 (westbound)

(3B) & (3C)

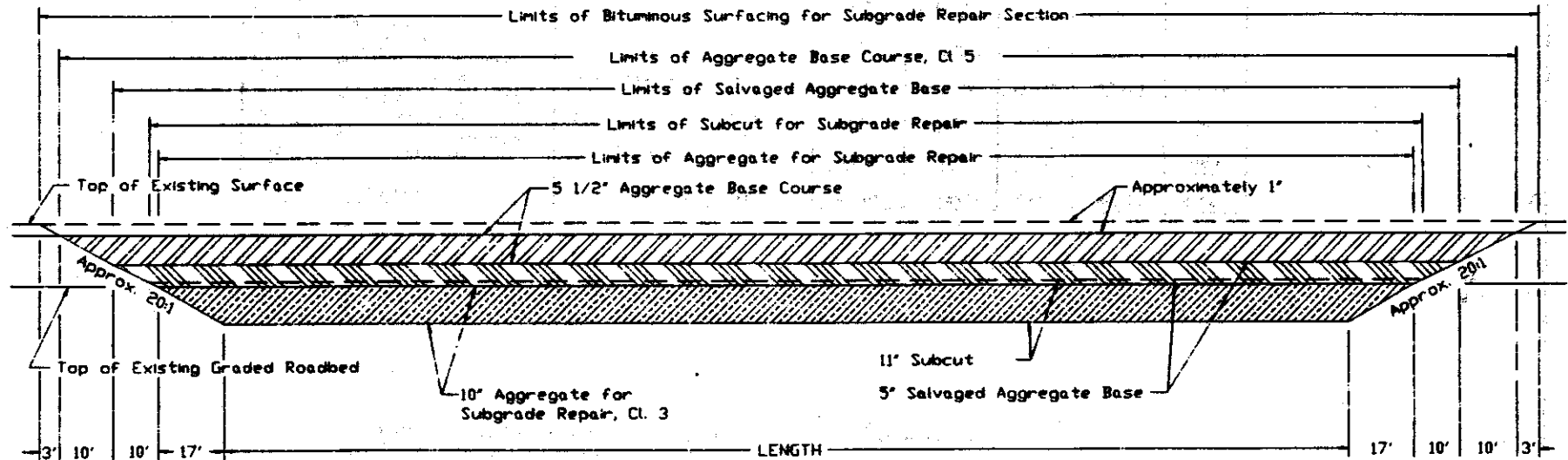


LONGITUDINAL PROFILE GRADE

SUBGRADE REPAIR AREA

Sta. 324+95.25 to 334+75.25 (Westbound)
Sta. 540+15.25 to 550+95.25 (Westbound)

(30)



LONGITUDINAL PROFILE GRADE

LOCATIONS AND ESTIMATED QUANTITIES FOR
TYPICAL SUBGRADE REPAIR SECTION

(20) (30) (3C) (3B)

MILE	STA. to STA. (Includes Transition)	LENGTH		COMMON EXC. SUBCUT CU. YDS	SALVAGED AGGR. BASE COURSE TON	AGGR. FOR SUBGRADE REPAIR-CL. 3 TON	AGGR. BASE COURSE CL. 5 TON	PERMEABLE ASPHALT STABILIZED BASE TON	WATER 'H' GAL
		TANG.	CURVE						
319	140+75.25 145+55.25 (Eastbound)	489.7'	70.3'	986	595	1848	745		47.6
320	194+55.25 199+35.25 (Eastbound)	480'		986	595	1848	745		47.6
319 322	182+75.25 284+95.25 (Westbound)	14,331.1'	3,888.9'	49,869	19,565	46,885	26,678	*2,823	1,860.8
323	324+95.25 334+75.25 (Westbound)	980'		2,483	1,256	2,813	1,288		187
327	548+15.25 550+95.25 (Westbound)	608.7'	479.3'	2,753	1,398	3,119	1,412		118.4
	TOTALS			56,277	23,401	48,817	30,852	*2,823	2,182

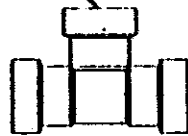
WATER: 20 Gals/Ton of Aggr. For Subgrade Repair, Aggr. Base Course CL. 5.
Salvaged Aggregate Base Course

* Quantity figured at 1.7 Ton/C.Y.

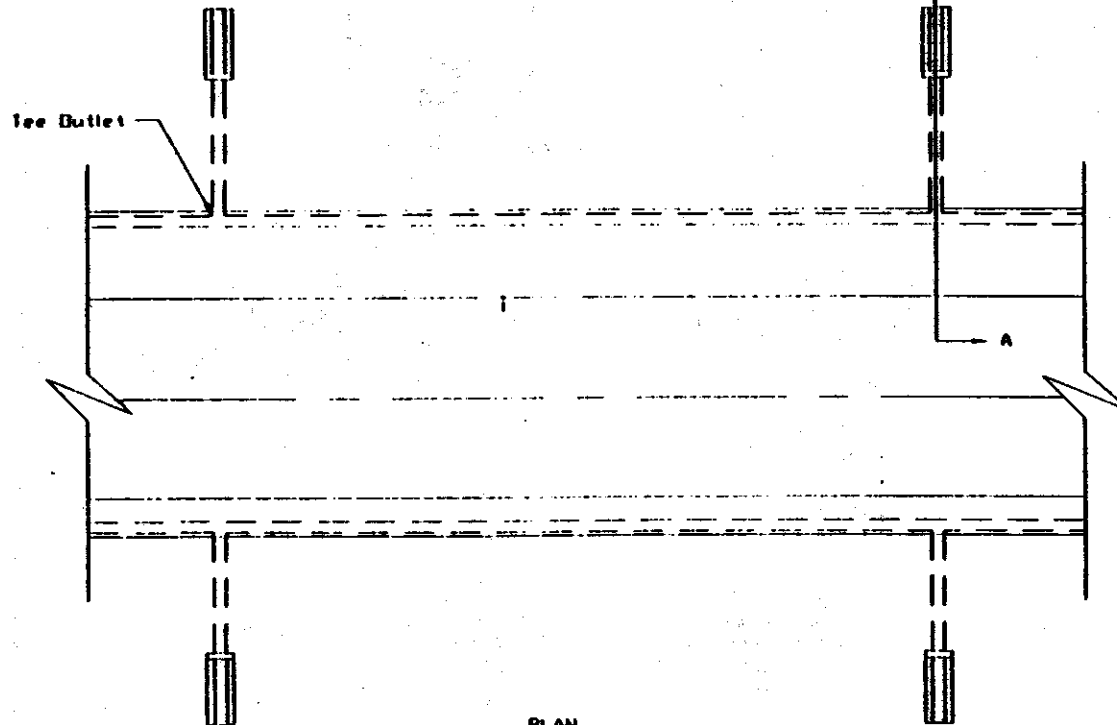
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	NH-6-002(039)318	35

4"x4" PVC Tee

OUTLET PIPE DETAIL



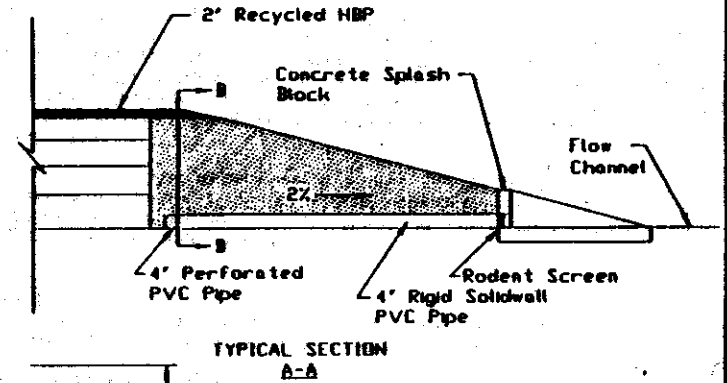
Detail B Intersection of
Perforated PVC Pipe and
Edge Drain Pipe



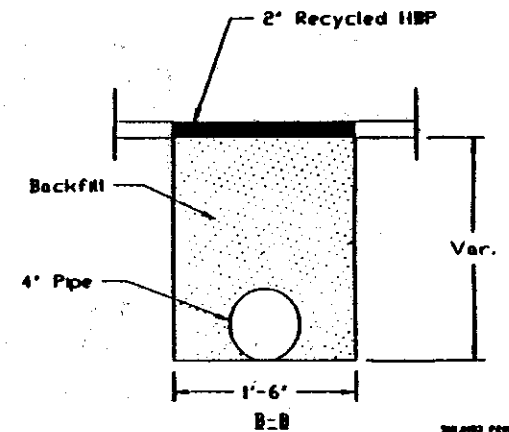
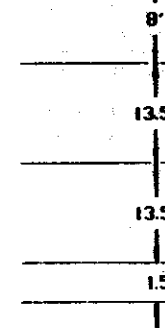
PLAN

NOTE: Outlets shall be placed every 300'

All rodent screens, pipe fittings, concrete splash blocks and any other miscellaneous appurtenances required to install the edge drain system shall be included in the price bid for "Underdrain, Pipe PVC Non-Perforated 4 in."



TYPICAL SECTION
A-A

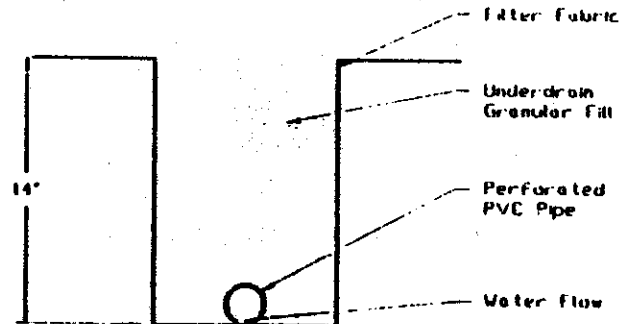


B-B

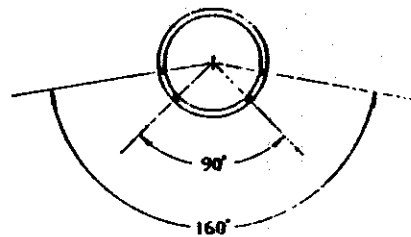
SEE SHEET 35

PERFORATED PVC PIPE DETAIL

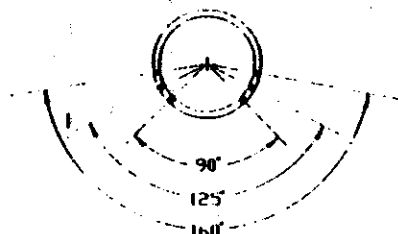
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	W-6-002(039)318	38



Sta. 239+04.8 to Sta. 265+44.8



FOUR ROWS



SIX ROWS

PIPE SIZE	ROWS OF PERFORATIONS	NUMBER OF PERFORATIONS/ROW
4"	4	48
6"	4	48
8"	4	47
9"	4	47
10"	5	47
12"	6	47

*For 12.5 foot pipe laying lengths

All PVC pipe used shall be encased as shown. Filter fabric shall meet the requirements of the supplemental specifications on Geotextile Filter Fabric. Underdrain Granular Fill shall meet the aggregate gradation requirements of SP 208 for Sta. 239+04.8 to Sta. 265+44.8. The Underdrain Granular fill from Sta. 212+64.8 to Sta. 239+04.8 shall meet the aggregate gradation of Class 5 Aggregate.

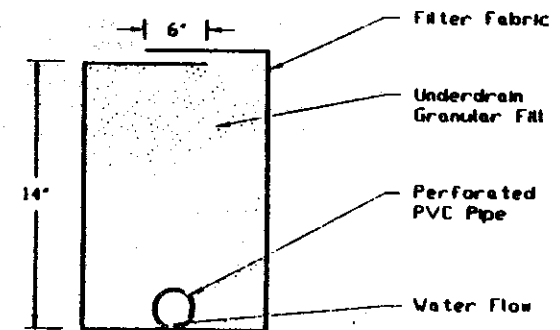
The cost of the underdrain granular fill, filter fabric and all labor and equipment necessary to construct the underdrain as shown shall be included in the price bid for 4 inch perforated PVC pipe for underdrains.

TYPE OF PIPE

The pipe shall be polyvinyl chloride sewer pipe with solvent cemented joints as specified in ASTM D-3034 or F-949.

Perforations shall be circular and 1/4" ± 1/16" in diameter. They should be arranged in rows parallel to the axis of the pipe and shall be spaced approximately 3" center to center along the rows. The placement and total number of the rows shall be as shown with an allowable tolerance of ±10.

The nominal laying length of the pipe shall be 12.5 feet. Shorter or longer laying lengths shall be provided if required.

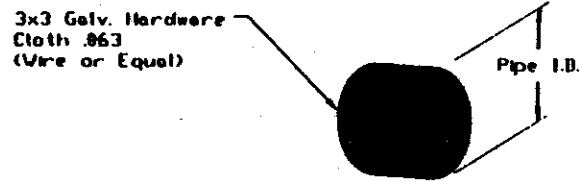


Sta. 212+64.8 to Sta. 239+04.8

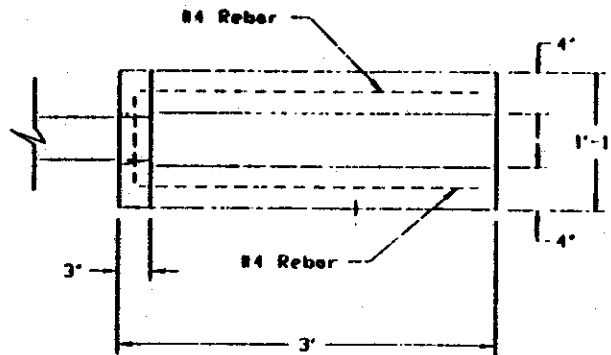
CONCRETE SPLASH BLOCK FOR PIPE OUTLET

FHA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	CM-8-002(039)318	37

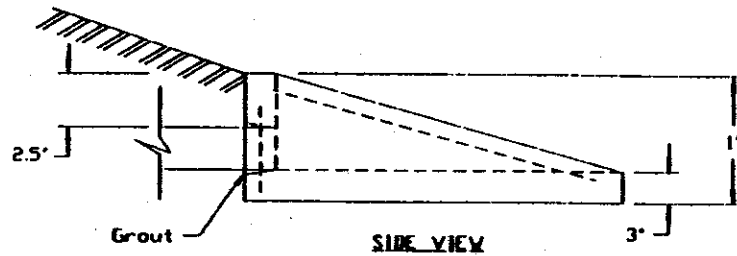
Revised 4-13-92



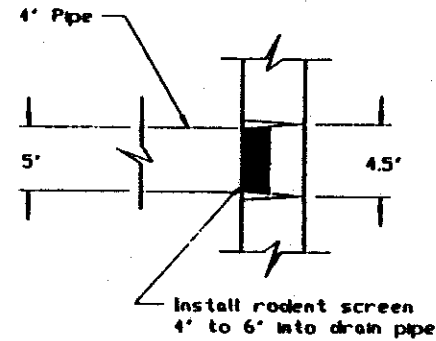
RODENT SCREEN DETAIL



TOP VIEW



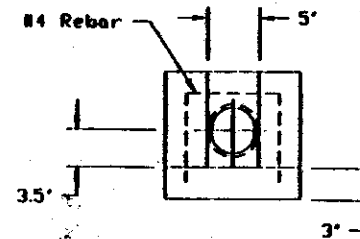
SIDE VIEW



4' PIPE HOLE DETAIL

NOTE: All dimensions shown for concrete headwall are minimum dimensions.

The concrete used for the Concrete Splash Block shall be Class Y or better with aggregate that meets 3.4, or 5, of Section 816.02 of the Standard Specifications.



FRONT VIEW

Appendix B

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

PERMEABLE ASPHALT STABILIZED BASE

APRIL 24, 1992

DESCRIPTION

This work shall consist of constructing a permeable base course of aggregate and bituminous material mixed in a central plant and spread and compacted on a prepared subbase.

EQUIPMENT

Equipment shall conform to the following:

<u>Item</u>	<u>Section</u>
General	151.01
Rollers	151.02 C
Material Hauling Equipment	151.03 B
Bituminous Pavers	151.04
Truck Scales	151.07
Automatic Scales	151.08
Hot Bituminous Equipment	152
Roadbed Planer	153.06

MATERIALS

1. Aggregate for the asphalt stabilized permeable base shall be of the following gradation:

<u>Sieve Size</u>	<u>Allowable % Passing</u>
1"	100
3/4"	95-100
1/2"	85-100
3/8"	60-90
#4	15-25
#8	2-10
#16	2-5
#200	0-3

Eighty-five percent of the material retained on the #8 sieve shall have at least 2 fractured faces produced by a crushing process. The LA abrasion loss shall be 50% or less and the shale content shall be a maximum of 8%.

2. The asphalt cement shall be 60-70 penetration grade asphalt which meets the requirements of Section 818.02 A.1.
3. The asphalt content shall be 2 1/2% by weight of the mix.

CONSTRUCTION REQUIREMENTS

1. General. Prior to placing the permeable base the subbase shall be trimmed to the required grade and cross section by a roadbed planer. At the time the permeable base is placed, the elevation of the finished surface of the subbase shall not vary by more than 0.04 foot from the prescribed elevation at any point where measurement is made.
2. Material Production and Placement. The permeable base shall be produced at a central hot mix plant in accordance with Section 408.04 E and 408.04 F Paragraph one. The material produced shall be placed with a bituminous paver.
3. Compaction. Compaction of the permeable base shall be in accordance with Section 302.04 F.1. except the rollers shall be steel wheeled rollers. No vibration will be allowed. The contractor is advised that it may be necessary to permit the permeable base to cool sufficiently before compaction rolling to prevent rutting and shoving. Cooling to 150 degrees F may be appropriate, but in no case shall the mix be less than 110 degrees F at time of compaction. Water may not be used to hasten the cooling process.
4. Finished Surface. The surface of the permeable base shall be smooth and uniform, and shall reasonably conform to the specified lines, grades, and typical section. Trimming of the permeable base shall not be permitted. Care shall be exercised to prevent contamination of the permeable base. Procedures that might produce fine material that would tend to clog or reduce drainage shall not be permitted. Permeable base which, in the opinion of the Engineer, has been contaminated shall be removed and replaced by the Contractor at his own expense.
5. Traffic. Hauling on the permeable base shall not be allowed, except for backing trucks to the paver paving the subsequent lift. Traffic over the permeable base shall be limited to the minimum necessary for succeeding or adjacent work. Damage to the permeable base shall be repaired promptly at the Contractors expense, as directed by the Engineer.
6. Edge Drains. Prior to placing the edge drain, the outlet edge of the permeable base shall be kept open (daylighted) so that water is free to exit and not be ponded within the permeable base.

METHOD OF MEASUREMENT

1. Bitumen. Bitumen will be measured by the ton according to Section 109.

2. Permeable Base. Asphalt Stabilized Permeable Base acceptably placed, compacted, and maintained shall be measured by the ton. The tonnage will be the weight used in the accepted base and no deduction will be made for the weight of bitumen used in the mixture.

BASIS OF PAYMENT

The accepted quantity of bitumen and permeable base will be paid for at the contract price bid per ton. The price shall be full compensation for all materials, equipment, labor, and incidentals required to construct this item of work as specified.

Appendix C

1996 PAVE TECH DISTRESS REPORT
GRAND FORKS DISTRICT HIGHWAY 2 PROJECT
July 1, 1996

NAME	HWY	FMP	TMP	DATE	D	O	AC	BLD	L	T	BC	RW	BP	RUT	SCORE	AVG RUT	ROU INX	IRI
ASP EASTBOUND																		
002E319000	002	319000	320000	102095	E	8	0	0	4	5	0	1	0	0	89.00	0.04	4.15	1.14
002E320000	002	320000	321000	102095	E	8	0	0	2	2	0	0	0	0	95.00	0.03	4.16	1.13
002E321000	002	321000	322000	102095	E	8	2	0	2	2	0	0	0	0	93.00	0.03	4.09	1.20
002E322000	002	322000	323000	102095	E	8	0	0	0	2	0	0	0	0	97.00	0.04	3.97	1.32
002E323000	002	323000	324000	102095	E	8	0	0	1	4	0	0	6	0	88.00	0.04	4.04	1.25
002E324000	002	324000	325000	102095	E	8	2	0	4	4	0	0	6	0	83.00	0.04	3.97	1.32
002E325000	002	325000	326000	102095	E	8	0	0	2	4	0	0	6	0	87.00	0.04	4.08	1.21
002E326000	002	326000	327000	102095	E	8	2	0	1	4	0	0	6	0	86.00	0.03	3.90	1.40
002E327000	002	327000	328000	102095	E	8	2	0	0	7	0	0	6	0	84.00	0.05	4.05	1.24
ASP WESTBOUND																		
002W327000	002	328000	327000	102095	W	8	0	0	1	4	0	0	0	0	94.00	0.08	4.23	1.06
002W326000	002	327000	326000	102095	W	8	0	0	1	4	0	0	0	0	94.00	0.06	4.31	0.98
002W325000	002	326000	325000	102095	W	8	0	0	0	4	0	0	0	0	95.00	0.03	4.40	0.90
002W324000	002	325000	324000	102095	W	8	0	0	4	4	0	0	0	0	91.00	0.03	4.40	0.90
002W323000	002	324000	323000	102095	W	8	0	0	1	1	0	0	0	0	97.00	0.07	4.06	1.23
002W322000	002	323000	322000	102095	W	8	0	0	1	1	0	0	0	0	97.00	0.10	3.93	1.36
002W321000	002	322000	321000	102095	W	8	0	0	0	1	0	0	0	0	98.00	0.10	3.93	1.37
002W320000	002	321000	320000	102095	W	8	0	0	1	4	0	0	0	0	94.00	0.08	4.22	1.07
002W319000	002	320000	319000	102095	W	8	0	0	1	4	0	0	0	0	94.00	0.05	4.13	1.16

LEGEND: D=DIRECTION
AC=ALIGATOR CRACKING
BLD=BLEEDING
BB=BROKEN SLAB
CB=CORNER BREAKS
DC=DURABILITY CRACKING
L,LC=LONGITUDINAL CRACKS
LJS=LONG.JOINT SPALLING
RW=RAVELING&WEATHERING
T,TC=TRANSVERSE CRACKS
TJS=TRAN.JOINT SPALLING
SH=SHOULDER CONDITION
AVG RUT= (inches/mile)
IRI=INTERNATIONAL ROUGHNESS INDEX (m/km)

O=OBSERVER ID-CODE
BC=BLOCK CRACKING
BP=BITUMINOUS PATCH
BU=BLOWUPS/MILE
CP=CONCRETEPATCH
FLT=DEDUCT FOR FAULTING:
 size & number in mile
RUT=RUTTING DEDUCT:
 depth average for mile
TCS=TRAN CRACK SPALLING
SC=SCORE(on first 500ft):
 99 minus distress deducts
ROU INX=ROUGHNESS INDEX:
 (RIDE SCORE for the mile)

PAVETECH DISTRESS REPORT LEGEND

INDOT RIDE INDEX AND RUT REPORT

EAST MILE 318.000 TO 319.500				EAST MILE 319.500 TO 321.500				WEST MILE 321.500 TO 322.500				EAST MILE 322.500 TO 323.500			
IRI	ROUGH	AVG		IRI	ROUGH	AVG		IRI	ROUGH	AVG		IRI	ROUGH	AVG	
AVG	INDEX	RUT		AVG	INDEX	RUT		AVG	INDEX	RUT		AVG	INDEX	RUT	
0	1.26	4.03	0.04	0	0.98	4.32	0.06	0	1.87	3.88	0.18	0	1.38	3.91	0.03
100	1.24	4.05	0.04	100	1.17	4.12	0.05	100	2.91	2.77	0.13	100	1.71	3.83	0.02
200	1.20	4.09	0.06	200	1.00	4.30	0.03	200	1.95	3.44	0.19	200	1.17	4.12	0.03
300	1.32	3.87	0.08	300	0.98	4.32	0.02	300	2.14	3.30	0.16	300	1.27	4.02	0.02
400	0.87	4.33	0.09	400	1.30	3.99	0.02	400	1.19	4.10	0.22	400	1.08	4.23	0.03
500	1.08	4.23	0.07	500	1.33	3.98	0.03	500	1.58	3.74	0.15	500	0.94	4.36	0.01
600	1.10	4.19	0.06	600	1.28	4.03	0.04	600	1.57	3.75	0.10	600	1.33	3.98	0.02
700	1.21	4.08	0.04	700	1.10	4.19	0.03	700	2.00	3.40	0.07	700	1.28	4.01	0.02
800	1.17	4.12	0.04	800	1.11	4.18	0.02	800	1.45	3.85	0.10	800	1.54	3.78	0.02
900	0.81	4.51	0.05	900	0.89	4.42	0.02	900	1.44	3.86	0.09	900	1.17	4.12	0.02
1000	1.13	4.16	0.03	1000	1.34	3.95	0.02	1000	1.31	3.98	0.13	1000	1.04	4.25	0.03
1100	1.35	3.85	0.04	1100	1.10	4.19	0.03	1100	1.11	4.18	0.10	1100	1.48	3.83	0.02
1200	1.12	4.17	0.04	1200	1.20	4.08	0.04	1200	1.13	4.16	0.13	1200	1.05	4.24	0.03
1300	1.36	3.94	0.04	1300	1.15	4.14	0.02	1300	1.12	4.17	0.18	1300	1.21	4.08	0.01
1400	1.25	4.04	0.03	1400	1.25	4.04	0.02	1400	1.64	3.89	0.15	1400	1.11	4.18	0.03
1500	1.22	4.07	0.02	1500	1.28	4.03	0.02	1500	1.16	4.13	0.08	1500	1.33	3.98	0.04
1600	1.30	3.99	0.04	1600	1.40	3.90	0.02	1600	1.05	4.24	0.03	1600	1.47	3.84	0.03
1700	1.30	3.99	0.02	1700	0.95	4.35	0.02	1700	1.08	4.21	0.03	1700	1.84	3.69	0.02
1800	0.95	4.35	0.06	1800	1.05	4.24	0.01	1800	1.23	4.06	0.04	1800	1.15	4.14	0.02
1900	0.97	4.33	0.07	1900	1.14	4.15	0.01	1900	1.18	4.11	0.06	1900	1.48	3.83	0.02
2000	1.02	4.27	0.08	2000	0.94	4.36	0.01	2000	0.84	4.48	0.03	2000	1.37	3.93	0.02
2100	1.33	3.78	0.05	2100	0.75	4.58	0.01	2100	0.97	4.33	0.07	2100	1.38	3.94	0.03
2200	1.27	4.02	0.02	2200	0.98	4.32	0.02	2200	0.99	4.31	0.09	2200	1.58	3.74	0.02
2300	1.58	3.74	0.02	2300	0.84	4.48	0.06	2300	1.42	3.88	0.08	2300	1.32	3.97	0.04
2400	0.89	4.31	0.02	2400	0.99	4.31	0.03	2400	1.20	4.09	0.07	2400	0.99	4.31	0.04
2500	1.43	3.87	0.04	2500	0.87	4.44	0.02	2500	1.30	3.81	0.05	2500	1.19	4.10	0.02
2600	0.88	4.70	0.08	2600	1.24	4.05	0.01	2600	1.27	4.02	0.06	2600	1.15	4.14	0.03
				2700	1.02	4.27	0.01	2700	1.04	4.25	0.08				
				2800	0.83	4.37	0.02	2800	0.96	4.34	0.07				
				2900	0.84	4.48	0.03	2900	1.59	3.73	0.08				
				3000	1.18	4.13	0.03	3000	1.48	3.85	0.13				
				3100	0.74	4.80	0.01	3100	3.48	2.43	0.12				
				3200	1.05	4.24	0.02	3200	1.68	3.68	0.14				
				3300	0.85	4.35	0.02	3300	1.82	3.71	0.12				
				3400	0.88	4.70	0.01	3400	1.75	3.80	0.14				
				3500	0.99	4.31	0.02	3500	1.39	3.91	0.08				
				3600	0.90	4.41	0.01	3600	1.08	4.23	0.09				
				3700	0.80	4.52	0.01	3700	0.71	4.63	0.12				
				3800	0.78	4.53	0.01	3800	0.87	4.44	0.08				
				3900	0.95	4.25	0.02	3900	1.12	4.17	0.10				
				4000	1.01	4.26	0.01	4000	0.95	4.35	0.11				
				4100	0.97	4.33	0.02	4100	0.89	4.42	0.08				
				4200	0.80	4.52	0.03	4200	0.98	4.32	0.08				
				4300	0.99	4.31	0.02	4300	1.04	4.25	0.08				
				4400	0.94	4.36	0.02	4400	0.94	4.36	0.04				
				4500	1.03	4.26	0.01	4500	1.02	4.27	0.03				
				4600	0.88	4.43	0.01	4600	0.80	4.52	0.06				
				4700	1.09	4.20	0.02	4700	1.03	4.26	0.09				
				4800	1.02	4.27	0.02	4800	0.94	4.36	0.09				
				4900	1.05	4.24	0.02	4900	0.91	4.39	0.06				
				5000	0.98	4.32	0.01	5000	1.02	4.27	0.12				
				5100	1.02	4.27	0.02	5100	0.99	4.31	0.14				
				5200	1.22	4.07	0.03	5200	0.94	4.36	0.19				
				5300	1.23	4.08	0.02	5300	1.04	4.25	0.13				
				5400	1.08	4.21	0.03	5400	0.98	4.32	0.13				
				5500	1.16	4.13	0.07	5500	1.00	4.30	0.07				
				5600	1.58	3.78	0.08	5600	0.75	4.58	0.04				
				5700	1.28	4.21	0.03	5700	1.23	4.06	0.06				
				5800	1.17	4.12	0.06	5800	1.12	4.17	0.05				
				5900	1.34	3.95	0.04	5900	1.07	4.22	0.07				
				6000	1.19	4.10	0.02	6000	0.89	4.42	0.05				
				6100	1.18	4.11	0.04	6100	0.89	4.31	0.05				
				6200	1.20	4.09	0.03	6200	1.53	3.78	0.08				
				6300	1.22	4.07	0.03	6300	0.95	4.35	0.07				
				6400	1.02	4.27	0.02	6400	0.82	4.50	0.07				
				6500	1.21	4.08	0.04	6500	1.01	4.28	0.09				
				6600	1.82	3.71	0.05	6600	1.06	4.21	0.08				
				6700	1.11	4.18	0.07	6700	1.28	4.01	0.08				
				6800	1.36	3.84	0.05	6800	1.29	4.00	0.06				
				6900	1.32	3.97	0.05	6900	1.31	3.98	0.09				
				7000	1.64	3.89	0.04	7000	1.77	3.58	0.12				
				7100	1.50	3.81	0.02	7100	0.82	4.50	0.09				
				7200	1.55	3.77	0.02	7200	1.08	4.21	0.06				
				7300	0.95	4.36	0.03	7300	0.87	4.44	0.08				
				7400	1.14	4.15	0.01	7400	1.03	4.28	0.03				
				7500	1.12	4.17	0.02	7500	1.13	4.16	0.07				
				7600	1.85	3.88	0.03	7600	0.80	4.52	0.05				

NODOT RIDE INDEX AND RUT REPORT

EAST MILE 319.500 TO 321.500				WEST MILE 321.669 TO 319.000			
	IRI AVG	ROUGH INDEX	AVG RUT		IRI AVG	ROUGH INDEX	AVG RUT
7700	1.57	3.75	0.08	7700	0.93	4.37	0.06
7800	1.63	3.70	0.03	7800	0.94	4.38	0.07
7900	2.07	3.36	0.06	7900	1.06	4.23	0.09
8000	1.48	3.83	0.03	8000	1.23	4.08	0.14
8100	1.34	3.96	0.02	8100	2.91	2.77	0.12
8200	1.24	4.05	0.02	8200	1.22	4.07	0.06
8300	1.15	4.14	0.02	8300	1.27	4.02	0.08
8400	1.29	4.00	0.01	8400	1.05	4.24	0.06
8500	1.06	4.21	0.02	8500	0.96	4.32	0.09
8600	1.20	4.09	0.02	8600	0.96	4.34	0.11
8700	0.95	4.35	0.03	8700	0.75	4.58	0.10
8800	1.10	4.19	0.04	8800	0.96	4.34	0.10
8900	1.02	4.27	0.03	8900	0.98	4.32	0.07
9000	0.99	4.31	0.03	9000	1.01	4.28	0.02
9100	1.12	4.17	0.01	9100	1.18	4.13	0.02
9200	1.17	4.12	0.01	9200	1.08	4.23	0.05
9300	0.81	4.51	0.03	9300	0.77	4.56	0.06
9400	0.88	4.67	0.05	9400	1.54	3.78	0.09
9500	1.19	4.10	0.02	9500	1.47	3.84	0.08
9600	0.85	4.46	0.01	9600	1.45	3.85	0.07
9700	1.11	4.18	0.01	9700	1.32	3.97	0.05
9800	0.97	4.33	0.03	9800	1.31	3.98	0.06
9900	1.07	4.22	0.03	9900	0.95	4.35	0.07
10000	1.06	4.23	0.03	10000	1.01	4.28	0.05
10100	1.24	4.05	0.03	10100	1.01	4.28	0.07
10200	1.45	3.85	0.02	10200	1.07	4.22	0.06
10300	1.17	4.12	0.02	10300	0.80	4.52	0.04
10400	1.34	3.95	0.05	10400	1.42	3.88	0.07
10500	1.76	3.59	0.05	10500	0.77	4.56	0.03
				10600	0.96	4.34	0.03
				10700	1.03	4.26	0.05
				10800	1.02	4.27	0.06
				10900	0.83	4.49	0.05
				11000	1.10	4.19	0.06
				11100	0.96	4.34	0.07
				11200	0.77	4.56	0.06
				11300	1.11	4.16	0.03
				11400	1.13	4.16	0.03
				11500	1.11	4.18	0.03
				11600	1.05	4.24	0.06
				11700	1.11	4.18	0.06
				11800	1.01	4.28	0.07
				11900	0.96	4.32	0.04
				12000	1.96	3.43	0.04
				12100	3.63	2.34	0.04
				12200	1.05	4.24	0.02
				12300	0.75	4.58	0.07
				12400	0.96	4.32	0.08
				12500	0.86	4.45	0.09
				12600	1.14	4.15	0.11
				12700	1.49	3.82	0.06
				12800	0.85	4.46	0.05
				12900	1.39	3.91	0.03
				13000	1.25	4.04	0.02
				13100	1.00	4.30	0.03
				13200	1.02	4.27	0.03
				13300	1.49	3.82	0.02
				13400	1.13	4.16	0.03
				13500	0.96	4.32	0.06
				13600	1.37	3.93	0.06
				13700	1.45	3.85	0.05
				13800	1.17	4.12	0.04
				13900	0.88	4.43	0.03
				14000	1.23	4.06	0.05
				14100	1.06	4.21	0.06